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SOME FACTORS INFLUENCING, IN VIVO, THE RESULT OF THE GLOBULIN PRECIPITATION TEST

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In the early history of the globulin precipitation test as inaugurated by Klauser the explanation for the occurrence of a precipitate in a fresh serum upon dilution with distilled water was given by that author. It was claimed that the precipitable substance is a globulin. It was maintained by Klauser* that this reaction is different in its nature from the Wassermann reaction, in as much as it occurs in the early stage of syphilis a long time before the Wassermann reaction becomes positive. In 1924 Schill and Brossa* showed that the globulin precipitation reaction was positive in 100 per cent of lepers examined. Furthermore, Schill and Ramirez* found that this reaction is positive in yaws, in which disease, as in syphilis, the globulin reaction precedes the Wassermann reaction; and, after thorough specific treatment of cases of yaws, when the Wassermann reaction has become negative, the globulin precipitation reaction persists, particularly in patients who show residual symptoms such as innumerable lymphatic glands. In that respect the globulin reaction, although not specific, is an

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anamnestic reaction. During the study of serology of yaws Bocini and Ramirez proved experimentally that the precipitate which forms from fresh framboeic serum, upon dilution with distilled water, is not the carrier of the Wassermann antibody. It has been shown that the precipitate is insoluble in water, that it gives a characteristic reaction for protein, and is soluble in any concentration of sodium chloride. From these findings a conclusion was drawn by these authors that the balance between salts and globulins in the positive sera is upset.

It remained to demonstrate experimentally how far the result of this precipitation test is influenced by the increase or decrease of protein substance in the circulating blood or by the increase or decrease of concentration of salts contained in the circulating blood. Experiments were arranged on rabbits, therefore, in such a way that their sera were subjected to this test before and after the injection of a foreign protein and of hypertonic and hypotonic salt solution. The details of the experiments are given in the tables forming a part of this paper.

DESCRIPTION OF TECHNIC

About 5 cubic centimeters of blood were withdrawn from the heart of the animal to be examined, by means of a sterilized syringe which was thoroughly washed with a sterilized physiologic salt solution to prevent hemolysis. The blood was placed in a sterilized test tube which was moistened with sterilized salt solution; it was allowed to stand until the serum separated. Only absolutely clear sera were used.

Five small test tubes for each blood specimen were arranged in a rack. One Wright's pipette marked to contain 0.2 cubic centimeter, and another one marked to contain 0.6 cubic centimeter, were rinsed with distilled water three times and dried. Two-tenths cubic centimeter of the fresh serum of the animal was placed in each tube by means of the 0.2 cubic centimeter Wright's pipette.

Distilled water was added to the five tubes from 1 to 5, in increasing amounts, to represent dilutions of 1:1, 1:2, 1:3, 1:4, and 1:5. Each tube was then revolved around its axis so as to mix the serum and the distilled water thoroughly.
The same dilutions of serum as described above were duplicated, using physiologic salt solution instead of distilled water.

The tubes were allowed to stand at room temperature (about 28°C) for two hours. They were then placed in the refrigerator; the results were read and recorded the next morning.

**Discussion of Experiments**

Animal I was tested by the globulin precipitation test (see Table I); in none of the dilutions (1:1, 1:2, 1:3, 1:4, 1:5) did precipitation, either with salt solution or with distilled water, take place. The animal then received intravenously 10 cubic centimeters of hypotonic salt solution. Blood was withdrawn from the heart of the animal and the clear serum gave precipitation in dilution with distilled water, but not with physiologic salt solution. The next day the animal received 10 cubic centimeters of normal horse serum per venam. It was bled again and its serum gave positive precipitation reaction in all dilutions, both with distilled water and with salt solution. Six days after the injection of horse serum a precipitate was still not evident with animal serum in dilutions 1:2, 1:3, 1:4, and 1:5 with distilled water, but no precipitation occurred upon dilution with salt solution. Two weeks after the injection of horse serum per venam, the serum of the same animal gave a faint precipitate in dilutions 1:1 and 1:2, and distinct precipitate in dilutions 1:3, 1:4, and 1:5; a trace of precipitate was noticeable in dilutions 1:4 and 1:5 with salt solution. Immediately after the injection of 10 cubic centimeters of 10 per cent salt solution the serum of the animal gave a negative result, as far as the precipitation is concerned, in all dilutions with physiologic salt solution as well as with distilled water.

Experiments on rabbits 2, 3, and 5, as evident from Tables 2, 3, and 4, are practically a duplication of the first experiment. The only differences being that rabbit 4 was injected with horse serum diluted to one-fourth of the original volume. Although the results with these three rabbits vary somewhat quantitatively, it is evident that the effect upon the result of the test of the increase or decrease of the salt on the one hand, and of the protein on the other hand, was in the same direction. It is further evident that the balance of the salts and protein in the circulating blood, upset by the dilution or high concentration
of salts, rectified itself far more quickly than was the case when
the concentration of the protein was increased by the injection
of protein solution—that is, horse serum. It stands to reason
that a small molecular salt solution will be eliminated more
quickly than will the large molecular protein.

In the next experiment (see Tables 5 and 8) the influence
of feeding and starvation upon the result of the globulin pre-
cipitation test was studied. The animals were starved twenty-
four or forty-eight hours and the test was performed at the end
of the starvation period. They were then allowed to feed and
were tested again. The feeding had apparently no effect upon
the result of the globulin precipitation test. The food consisted
of grass and oats. It was to be expected that the small amount
of protein contained in this kind of food would have little effect
upon the result of the test in an herbivorous animal.

Other factors were studied which may, theoretically speaking,
be expected to have a possible influence upon the result of the
globulin precipitation test. The factors of narcosis (Table 6)
and of intraperitoneal injection (Table 7) of a large amount of
physiologic salt solution, as well as of repeated bleeding were
studied (Table 9). It can be seen from the tables that the
effect of narcosis with ether was nil in rabbits. Intraperitoneal
injection, however, very likely due to the early excretion of the
liquid portion of the blood into the peritoneum, influenced the
reaction distinctly in such a way that positive precipitation was
noticed in a lower dilution of fresh serum six hours after intras-
peritoneal injection than immediately before the injection.

Rabbits 1 and 2 (Table 7) were examined before and after
intraperitoneal injection of 20 cubic centimeters of physiologic
salt solution. Six hours after the injection the result of the re-
action was the shifting of the precipitation toward the end of
higher concentration.

Rabbit 3 (Table 8) was fed 10 cubic centimeters of horse
serum. The globulin precipitation test of the rabbit serum was
performed two hours before and after feeding. The result was
the same in both examinations. The same experiment was ap-
plied to rabbit 4. The serum of this animal gave a positive re-
action before feeding but a negative reaction six hours after
feeding of 10 cubic centimeters of horse serum. Twenty-four
hours and seventy-two hours after feeding, the serum of this
animal gave a positive reaction.
In the next experiment (Table 9) the influence of successive bleeding upon the globulin reaction was investigated. Rabbits 10, 11, and 12 were bled 4 cubic centimeters of blood each, three times at intervals of two hours and twenty-four hours, respectively. The sera of all three of these rabbits gave a negative reaction on the first bleeding. On the examination of the second bleeding, rabbit 10 gave a negative reaction in all dilutions, but rabbit 11 gave a positive reaction in the dilutions 1:2, 1:4, and 1:8, and rabbit 12 gave the same reaction in dilutions 1:2 to 1:8. On the third bleeding the sera of all of these animals gave a positive result in all the dilutions.

CONCLUSIONS

1. The decrease in concentration of salts in the circulating blood causes the globulin precipitation reaction to become stronger.
2. The increase in concentration of salts in the circulating blood brings about a weaker or a completely negative result.
3. The increase of protein in the circulating blood has as a consequence a very strongly positive globulin precipitation reaction.
4. The influence upon the result of the reaction of the increased protein content in the circulating blood can be detected for a much longer time than can the effect upon the reaction of the increased or decreased salt content in the circulating blood.
5. The influence of general anæsthesia, starvation, and feeding upon the result of the reaction in herbivorous animals is not perceptible. Exudation, however, into secret cavities produces increase in strength of the globulin precipitation reaction.
6. The administration, as a feed, of protein by mouth to herbivorous animals does not influence the result of globulin reaction.
7. Repeated bleeding at relatively short intervals also influences the result of the reaction in a positive direction.

ACKNOWLEDGMENT

Thanks are due to Dr. Otto Schöfl, of the division of biology and serum laboratory, Bureau of Science, for valuable assistance in carrying out this work.
### Table 1—Showing the result of the globulin precipitation test in rabbit 2.

<table>
<thead>
<tr>
<th>Dilation of serum</th>
<th>1:1</th>
<th>1:2</th>
<th>1:4</th>
<th>1:8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rabies injection</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>After injection</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Rabies injection</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>After injection</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Rabies injection</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>After injection</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Rabies injection</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>After injection</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Rabies injection</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>After injection</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Rabies injection</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>After injection</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

*Picrotoxin and sodium.*

### Table 2—Showing the result of the globulin precipitation test in rabbit 7.

<table>
<thead>
<tr>
<th>Dilation of serum</th>
<th>1:1</th>
<th>1:2</th>
<th>1:4</th>
<th>1:8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rabies injection</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>After injection</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Rabies injection</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>After injection</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Rabies injection</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>After injection</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Rabies injection</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>After injection</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Rabies injection</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>After injection</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Rabies injection</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>After injection</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

*Picrotoxin and sodium.*
TABLE 2.—Showing the result of the globulin precipitation test in rabbit 1.

<table>
<thead>
<tr>
<th>Division of serum</th>
<th>1:2</th>
<th>1:4</th>
<th>1:8</th>
<th>1:16</th>
<th>1:32</th>
</tr>
</thead>
<tbody>
<tr>
<td>Immediately after injection</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>10 per cent saline</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>20 per cent saline</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>

TABLE 4.—Showing the result of the globulin precipitation test in rabbit 1.

<table>
<thead>
<tr>
<th>Division of serum</th>
<th>1:2</th>
<th>1:4</th>
<th>1:8</th>
<th>1:16</th>
<th>1:32</th>
</tr>
</thead>
<tbody>
<tr>
<td>Immediate after injection</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>10 per cent saline</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>20 per cent saline</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>

About 20 cc. of serum containing about 200 mg. of protein were placed in a tube to be divided into 10-cc. test tubes which were centrifuged for 5 minutes. A tube of sterile normal saline was placed in a water bath to be used as a control. To the serum tubes, 5 cc. of 0.85 per cent saline was added, and then 5 cc. of the saline was added to the serum tubes. After the serum had been treated in this manner, the serum was diluted by means of a specific buffer and 10 cc. of each dilution was examined.

TABLE 5.—Showing the result of the globulin precipitation test before and after freezing.

<table>
<thead>
<tr>
<th>Serum No.</th>
<th>Remarks</th>
<th>1:2</th>
<th>1:4</th>
<th>1:8</th>
<th>1:16</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Normal, before storage</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>2</td>
<td>Normal, after storage</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>3</td>
<td>Normal, before storage</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>4</td>
<td>Normal, after storage</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>5</td>
<td>Normal, before storage</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>6</td>
<td>Normal, after storage</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>
**Table 5**—Showing the result of the globulin precipitation test before and after treatment.

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Test Results</th>
<th>Dilution of serum</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Normal</td>
<td>1:1</td>
</tr>
<tr>
<td>2</td>
<td>Inflammatory after trauma</td>
<td>1:2</td>
</tr>
<tr>
<td>3</td>
<td>Normal</td>
<td>1:3</td>
</tr>
<tr>
<td>4</td>
<td>Inflammatory after trauma</td>
<td>1:4</td>
</tr>
<tr>
<td>5</td>
<td>Before trauma</td>
<td>1:10</td>
</tr>
<tr>
<td>6</td>
<td>Normal</td>
<td>1:20</td>
</tr>
<tr>
<td>7</td>
<td>Inflammatory after trauma</td>
<td>1:40</td>
</tr>
</tbody>
</table>

**Table 6**—Showing the result of the globulin precipitation test before and after intraperitoneal injection of 20 cubic centimeters of physiological salt solution.

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Test Results</th>
<th>Dilution of serum</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Normal</td>
<td>1:1</td>
</tr>
<tr>
<td>2</td>
<td>Inflammatory after trauma</td>
<td>1:2</td>
</tr>
<tr>
<td>3</td>
<td>Before trauma</td>
<td>1:3</td>
</tr>
<tr>
<td>4</td>
<td>Inflammatory after trauma</td>
<td>1:4</td>
</tr>
</tbody>
</table>

(Note: The table includes columns for each dilution ratio, with observations marked as '+' or '-' for positive or negative reactions.)
### Table 8—Showing the results of the globulin precipitation test before and after feeding with 30 cubic centimeters of horse serum.

<table>
<thead>
<tr>
<th>Patient</th>
<th>Remarks</th>
<th>1:1</th>
<th>1:2</th>
<th>1:3</th>
<th>1:4</th>
<th>1:5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Serous fluid, no change</td>
<td>PEK</td>
<td>PEK</td>
<td>PEK</td>
<td>PEK</td>
<td>PEK</td>
</tr>
<tr>
<td>2</td>
<td>Serum from head with</td>
<td>PEK</td>
<td>PEK</td>
<td>PEK</td>
<td>PEK</td>
<td>PEK</td>
</tr>
<tr>
<td>3</td>
<td>Serous fluid, no change</td>
<td>PEK</td>
<td>PEK</td>
<td>PEK</td>
<td>PEK</td>
<td>PEK</td>
</tr>
<tr>
<td>4</td>
<td>Serum from head with</td>
<td>PEK</td>
<td>PEK</td>
<td>PEK</td>
<td>PEK</td>
<td>PEK</td>
</tr>
<tr>
<td>5</td>
<td>Serous fluid, no change</td>
<td>PEK</td>
<td>PEK</td>
<td>PEK</td>
<td>PEK</td>
<td>PEK</td>
</tr>
<tr>
<td>6</td>
<td>Serum from head with</td>
<td>PEK</td>
<td>PEK</td>
<td>PEK</td>
<td>PEK</td>
<td>PEK</td>
</tr>
</tbody>
</table>

### Table 9—Showing the result of the globulin precipitation test after repeated bleeding.

<table>
<thead>
<tr>
<th>Patient</th>
<th>Remarks</th>
<th>1:1</th>
<th>1:2</th>
<th>1:3</th>
<th>1:4</th>
<th>1:5</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>First bleeding, a.m.</td>
<td>PEK</td>
<td>PEK</td>
<td>PEK</td>
<td>PEK</td>
<td>PEK</td>
</tr>
<tr>
<td>11</td>
<td>Second bleeding, a.m.</td>
<td>PEK</td>
<td>PEK</td>
<td>PEK</td>
<td>PEK</td>
<td>PEK</td>
</tr>
<tr>
<td>12</td>
<td>Third bleeding, a.m.</td>
<td>PEK</td>
<td>PEK</td>
<td>PEK</td>
<td>PEK</td>
<td>PEK</td>
</tr>
<tr>
<td>13</td>
<td>Fourth bleeding, a.m.</td>
<td>PEK</td>
<td>PEK</td>
<td>PEK</td>
<td>PEK</td>
<td>PEK</td>
</tr>
<tr>
<td>14</td>
<td>Fifth bleeding, a.m.</td>
<td>PEK</td>
<td>PEK</td>
<td>PEK</td>
<td>PEK</td>
<td>PEK</td>
</tr>
<tr>
<td>15</td>
<td>Sixth bleeding, a.m.</td>
<td>PEK</td>
<td>PEK</td>
<td>PEK</td>
<td>PEK</td>
<td>PEK</td>
</tr>
<tr>
<td>16</td>
<td>Seventh bleeding, a.m.</td>
<td>PEK</td>
<td>PEK</td>
<td>PEK</td>
<td>PEK</td>
<td>PEK</td>
</tr>
<tr>
<td>17</td>
<td>Eighth bleeding, a.m.</td>
<td>PEK</td>
<td>PEK</td>
<td>PEK</td>
<td>PEK</td>
<td>PEK</td>
</tr>
<tr>
<td>18</td>
<td>Ninth bleeding, a.m.</td>
<td>PEK</td>
<td>PEK</td>
<td>PEK</td>
<td>PEK</td>
<td>PEK</td>
</tr>
<tr>
<td>19</td>
<td>Tenth bleeding, a.m.</td>
<td>PEK</td>
<td>PEK</td>
<td>PEK</td>
<td>PEK</td>
<td>PEK</td>
</tr>
<tr>
<td>20</td>
<td>Eleventh bleeding, a.m.</td>
<td>PEK</td>
<td>PEK</td>
<td>PEK</td>
<td>PEK</td>
<td>PEK</td>
</tr>
</tbody>
</table>
SALTS OF LINOLEIC HEXABROMIDE FROM
LUMBANG OIL

By GILBERT A. JEMEREL,
Instructor in Chemistry, Diliman Institute,
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and

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The glycerides of linoleic, linolic, and oleic acids occur naturally in vegetable drying oils. These unsaturated glycerides, particularly linoleic and linolic, are the substances that absorb oxygen from the air and cause the oil to dry.

The commercial value of an oil suitable for the manufacture of paint and varnish depends on its drying power, which is really the oxygen-absorbing capacity of the particular esterified compounds contained in the oil. Previous experiments carried out on the oxidation of Philippine lumbang oil showed that linoleic glyceride was oxidized more readily than was linolic glyceride; also, the latter absorbed oxygen more rapidly than did oleic glyceride.

Linoleic glyceride has a greater capacity for the absorption of oxygen than has any of the other compounds contained in drying oils. This glyceride and the corresponding free linoleic acid are, therefore, substances of considerable importance, since the amount of this glyceride present in a drying oil determines to a considerable extent the commercial value of the oil.

Although linoleic glyceride and the free linoleic acid are substances which oxidize readily, they may be separated from an oil in the form of a stable hexabromide. Since this linoleic hexabromide (hexabrom stearic acid) is a stable form of linoleic compounds, it is an important substance in the chemical

\[ \text{Linoleic hexabromide (hexabrom stearic acid)} \]

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\[ \text{Although linoleic glyceride and the free linoleic acid are substances which oxidize readily, they may be separated from an oil in the form of a stable hexabromide. Since this linoleic hexabromide (hexabrom stearic acid) is a stable form of linoleic compounds, it is an important substance in the chemical} \]

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try of vegetable drying oils. Only a very few derivatives of this substance (hexahydropseudoisonitrile) have ever been prepared. Erdman and Bedford \(^1\) state that they prepared the potassium and barium salts of the hexahydropseudoisonitrile and also the methyl and ethyl esters, but they do not give the experimental details. Nor do they give the melting point or analysis of the salts.

In view of the fact that very little is known about linoleic hexahydroseudoisonitrile we thought it might be of interest to make a few salts of this substance and determine their solubility in various organic solvents. The data thus obtained may be useful in devising new methods of analysis and in working out more accurate separations of mixtures of halogen stearic acids, such as linolenic hexahydropseudoisonitrile, linolic tetrahydropseudoisonitrile, and oleic dihydropseudoisonitrile.

In order to study the chemical behavior of the unsaturated acids (which occur as glycerides in drying oils), or to make pure derivatives of these acids, it is necessary to separate each individual acid from the mixture of substances contained in the oil. The method commonly used is to decompose the glycerides and convert them into a mixture of free unsaturated acids. Since the unsaturated acids absorb oxygen readily when exposed to the air, they are treated with bromine and converted into the mixed bromo addition products \(^1\) (linolenic hexahydropseudoisonitrile, linolic tetrahydropseudoisonitrile, and oleic dihydropseudoisonitrile). The mixed bromides are very stable substances. Both the hexahydropseudoisonitrile and the tetrahydropseudoisonitrile may be separated from the dihydropseudoisonitrile and from each other by treatment with solvents, and they may be converted back again into the free acids by reduction \(^2\) with zinc in alcoholic solution. Thus it is possible experimentally to separate from an oil, such as linoleic, individual unsaturated acids and to study the chemistry of these acids and their derivatives.

**EXPERIMENTAL PROCEDURE**

In preparing a supply of linolenic acid hexahydropseudoisonitrile for our experiments, we used Philippine lumber oil, which is a drying oil used in making paints, varnishes, and similar products.\(^3\) The lumber oil we used was pressed from nuts of good quality and filtered first through glass wool and then through filter paper.

\(^1\) Dor, C. K., Chem. Soc., 49 (1900) 133.
\(^3\) Ibid. 8 (1903) 294, 295, and 216.
Imperial and West: Hexahalide from Launay Oil

Lumah oil consists almost entirely of glycerides of the unsaturated acids, linoleic, linolenic, and oleic. It serves as an excellent material for preparing linoleic and linolenic acids and their derivatives. When lumah oil is decomposed and the glycerides are converted into mixed unsaturated acids and these mixed acids brominated in ether solution, linolenic hexahalide is precipitated according to the following equation:

\[
\text{CH}_3\text{CH} \equiv \text{CH} \equiv \text{CH}_2 \text{CH} \equiv \text{CH} \equiv \text{CH}_2 \text{CH}(\text{CH}_3)\text{COOH}
\]

Linolenic acid

\[
\text{Br}_2\text{Br}_2\text{Br}_2\text{Br}_2\text{Br}_2\text{Br}_2
\]

Linolenic hexahalide

Linolenic acid halides.—Freshly prepared lumah oil wasaponified with anhydrous-free alcoholic potassium hydroxide in batches of 330 grams each. The resulting soaps were converted into halogenated acids which were extracted with ether, and the ether solution was dehydrated with sodium sulphate. The ethereal solution of mixed acids, containing about 600 grams of acid, was poured into a 5-liter flask and diluted with retailed ether to a volume of 4 liters. The flask containing the acids was immersed in a freezing bath of ice, salt, and water. The solution of mixed acids was stirred mechanically by means of a hot-air motor, and brominated according to the method of Elffler and Niggenthaler.* When the thermometer immersed in the acid solution registered —37° C, or below, a slight excess of the calculated quantity of bromine (185.3 cubic centimeters of specific gravity 2.13) was allowed to drop rather rapidly into the acid solution from a dropping funnel, the end of which was drawn out to a rather fine opening. The temperature of the acid solution was not allowed to rise above —30° C. In about three hours the required amount of bromine was added to the acid solution. To complete the reaction the mixture was allowed to remain in the ice bath and the stirring continued for about two hours longer. The reaction product was then filtered to separate the insoluble bromohalide. The halogenated acid was washed thoroughly with ether until white and then dried on layers of filter paper.


**Levine, J., Chemical Technology and Analysis of Oils, Fat, and Waxes 1 (1875) 865.
When the unsaturated acids of lamang oil are brominated at a low temperature, and especially in dilute solution, sticky products are not formed so readily as when the bromination is carried out in a more concentrated solution. It is also advisable to use a very slight excess of bromine, so that when the reaction is complete the mixture has a slightly yellow color. Incomplete bromination usually gives a reaction product that is somewhat oily and does not filter well.

To purify the limonene hexabromide, samples of about 40 grams were washed thoroughly with ether, after which the hexabromide was crystallized, in small portions, first from ethyl acetate and then from benzene. After each crystallization the acid was filtered through a Buchner funnel with the aid of a partial vacuum and then washed well with ether, dried, and powdered. After standing in a vacuum desiccator for some hours the melting point was determined and found to be 179.5° C. to 180.5° C.

The acid was analyzed by determining the bromine content. This was done by boiling about 0.1 gram of the substance with a concentrated aqueous solution of silver nitrate (containing about 0.5 gram of silver nitrate) and 50 cubic centimeters of pure concentrated nitric acid. The precipitated silver bromide was collected on a Gooch crucible.

<table>
<thead>
<tr>
<th>Analysis of limonene hexabromide.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formula</td>
</tr>
<tr>
<td>Found</td>
</tr>
</tbody>
</table>

In endeavoring to make derivatives of limonene hexabromide, considerable difficulty was experienced, because the acid is rather insoluble in the ordinary organic solvents and it is necessary to work with very dilute solutions. Limonene hexabromide does, however, dissolve to a certain extent in various solvents such as benzene, hexyl alcohol, ethyl acetate, xylene, pyridine, and the propyl and butyl alcohols.

Salts of limonene hexabromide were prepared by first converting the acid into the potassium salt. A methyl alcohol solution of the potassium salt was then treated with a methyl alcohol solution of an inorganic salt such as barium bromide. The precipitated salt thus obtained was purified and the melting point and solubility in various solvents were determined. The
lead salt was, however, prepared directly from the free linoleic hexabromide.

Potassium salt of linoleic hexabromide.—Ten grams of linoleic hexabromide were dissolved in about 200 cubic centimeters of hot benzyl alcohol. To the clear solution 12 cubic centimeters of hot alcoholic potassium hydroxide solution (1 cubic centimeter = 0.061394 gram potassium hydroxide) containing a very slight excess of the calculated amount of potassium hydroxide, were added with vigorous shaking. The potassium salt of the hexabromide was thrown down as a white, glistening precipitate. About 200 cubic centimeters of absolute alcohol were then added and the mixture heated (reflux) on a water bath for about five hours. The mixture was cooled, the supernatant liquid poured off, and the salt washed well with ether by defecation in order to remove all the benzyl alcohol. If the benzyl alcohol is not entirely removed, the salt is somewhat oily and difficult to dry.

In order to purify the potassium salt, it was washed with hot benzene to dissolve any unchanged hexabromide which might be present. The salt was then washed with ether and dried in a desiccator. Experiments showed that it is not desirable to dry salts of the hexabromide in an oven at 80° C., because continued heating tends to turn them somewhat brown, due to slight decomposition.

A determination of the melting point showed that at 180° C. the salt begins to turn slightly brown and that it melts, with decomposition, to an opaque brown liquid at 185° C. to 190° C.

In preparing the potassium salt, propyl alcohol, isopropyl alcohol, and acetone alcohol can be used in place of benzyl alcohol to dissolve the hexabromide. However, the acid is not as soluble in these solvents as in benzyl alcohol, so that about 500 cubic centimeters of solvents are required for each 5 grams of the acid and the solution is turbid.

Analysis of potassium salt of linoleic hexabromide.

<table>
<thead>
<tr>
<th>Mass (g)</th>
<th>Found (g)</th>
<th>Calculated for C₃₇H₆₆Br₁₂K₂O₁₁</th>
<th>Percent Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.239</td>
<td>10.251</td>
<td></td>
<td>0.20%</td>
</tr>
</tbody>
</table>

Calcium salt of linoleic hexabromide.—Five grams of the potassium salt of linoleic hexabromide were dissolved in about 5 liters of hot methyl alcohol and filtered. The solution was then heated again on a water bath. A solution of barium bromide was prepared by dissolving the salt in about 5 cubic centimeters
of water and adding 100 cubic centimeters of methyl alcohol.

This solution of barium bromide, containing about 23 grams of the salt, was heated and then added with constant stirring to the hot alkaline solution of the potassium salt. A white precipitate was formed immediately. The mixture was divided into two portions which were heated (reflux) for about nine hours. The liquid above the precipitate was then perfectly clear, an indication that the reaction was complete. The whole mixture was distilled to a volume of about 200 cubic centimeters, after which it was allowed to cool, and then thrown into about 1.5 liters of water, stirred, and filtered immediately. This treatment with water removed the potassium bromide and also the excess barium bromide, as shown by the bromide test with silver nitrate. The residue was washed with methyl alcohol and ether. It was then dried on layers of filter paper, powdered, and placed in a desiccator.

A melting point determination showed that, without crystallization, the barium salt of linoleic hexabromide turned slightly brown at 207°C, and became a brownish black mass at 208°C, without melting completely.

The formula of the salt was checked by determining the percentage of barium. A weighed quantity of the salt, placed in a porcelain crucible, was treated with a few drops of concentrated sulphuric acid and heated gently by heat reflected from a hot asbestos board placed above the crucible. In this way sputtering of material was avoided. After ignition with a Bunsen flame the barium was weighed as barium sulphate.

Analysis of barium salt of linoleic hexabromide.

<table>
<thead>
<tr>
<th>Substance</th>
<th>Calculated for Ca₂Br₆O₆Ca₂</th>
<th>Found</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barium</td>
<td>8.12</td>
<td>8.28</td>
</tr>
</tbody>
</table>

**Zinc salt of Linoleic Hexabromide.**—The zinc salt of linoleic hexabromide was prepared in the same way as the barium salt by mixing a hot solution of the potassium salt of linoleic hexabromide in methyl alcohol with a hot solution of zinc chloride in methyl alcohol (8% per cent). A white flocculent precipitate was formed. The mixture was then heated (reflux) until the methyl alcohol above the precipitate was completely clear, after which it was distilled to about one-fifth its volume and then allowed to cool. The precipitate was thrown into water, stirred, and filtered immediately. It was washed with methyl alcohol and ether, and then dried.
A melting point determination showed that, without crystallization, the salt decomposed sharply at 154°C.

The formula of the salt was checked by analysis in the same manner as was the formula of the potassium salt. A weighed quantity of the salt was converted into zinc sulphate by treating it with sulphuric acid. The zinc sulphate was then heated and weighed as zinc oxide.

**Analysis of zinc salt of linoleic acid.**

<table>
<thead>
<tr>
<th>Substance</th>
<th>Calculated</th>
<th>Found</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZnSO₄</td>
<td>1.54</td>
<td>1.52</td>
</tr>
</tbody>
</table>

**Lead salt of linoleic acid.** Five grams of linoleic acid were dissolved in about 200 cubic centimeters of boiling ethyl acetate. To the clear solution there was added with constant shaking a boiling, turbid, alcoholic solution of normal lead nitrate, containing a slight excess of the calculated amount of the salt. A white flocculent precipitate was formed. The mixture was heated (reflux) until the solution above the precipitate was completely clear. It was then distilled to about one-third the volume, thrown into water, and the mixture stirred and filtered. The residue was washed thoroughly with alcohol and ether, and then dried.

When the melting point was determined the salt turned slightly brown at 105°C, and melted, with decomposition, at 190°C to 195°C.

**Analysis of lead salt of linoleic acid.**

<table>
<thead>
<tr>
<th>Substance</th>
<th>Calculated</th>
<th>Found</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pb(linoleate)</td>
<td>21.18</td>
<td>21.19</td>
</tr>
</tbody>
</table>

**Solubility.**—Qualitative solubility experiments on the free linoleic acid were prepared were made at room temperature (about 30°C and designated as cold), and also in hot solvents. For low-boiling solvents like acetone, the solubility in hot solution was determined at the boiling temperature of the solvent. With high-boiling solvents, such as xylene, the temperature for solubility determination was about 30°C. In reporting the qualitative solubility data, the term "insoluble" is used for solvents which dissolve the acid or the solvate to the extent of about 1 to 4 per cent. For solubility below 1 per cent the term "insoluble" or "slightly soluble" was used.
are used. The term "very soluble" is used when about 5 per cent or more of the acid or the salts is dissolved.

Table 1—Solubility of lindene hexahydroxyde and some of its salts in different solvents.

<table>
<thead>
<tr>
<th>Solvent</th>
<th>Hexahydroxyde</th>
<th>Potassium Salt</th>
<th>Sodium Salt</th>
<th>Barium Salt</th>
<th>Calcium Salt</th>
<th>Zinc Salt</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ether</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Acetone</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Carbon tetrachloride</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Nitrobenzene</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Benzyl alcohol</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Alcohol</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Chloroform</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Ether</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Acetone</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Carbon tetrachloride</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Nitrobenzene</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Benzyl alcohol</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Alcohol</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Chloroform</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

As shown by the solubility data given in Table 1, lindene hexahydroxyde and the salts prepared from it are not very soluble in the ordinary organic solvents. Experiments showed that about 10 grams of the acid will dissolve in 200 cubic centimeters of benzyl alcohol at 100° C. Five grams of the acid will dissolve in 500 cubic centimeters of warm benzyl alcohol, and 21 grams of acid will dissolve in 400 cubic centimeters of warm ethylen. Although lindene hexahydroxyde is somewhat soluble in various solvents, salts of the acid are mostly insoluble or only slightly soluble. All of them, however, are soluble in hot benzyl alcohol and glacial acetic acid. The barium salt is soluble in hot benzyl alcohol; the zinc salt dissolves in hot benzyl alcohol, nitro ben-
cone, and pyridine; and the lead salt is soluble in hot benzyl alcohol and nitrobenzene. Hot normal propyl alcohol dissolves the potassium salt.

Melting point—A determination of the melting point of the salts showed that they all decompose when heated to a sufficiently high temperature. This is not surprising since, according to the literature, various salts of long-chain aliphatic acids do not give a sharp melting point.

Several salts of acids such as myristic, palmitic, stearic, and oleic have been prepared by other investigators, but the melting-point data of these salts are not recorded in the usual reference books.

All of the various salts that we prepared the zinc salt seemed to give the best melting point, although it melted sharply with decomposition.

In conclusion it may be noted that, of the various salts prepared from linolenic and linoleic acids, the zinc salt appears to be the most stable.

**SUMMARY**

A considerable quantity of linolenic hexahexenamide (melting point, 179.5° C to 180.5° C) was prepared.

The lead salt of linolenic hexahexenamide was prepared by treating a solution of the free acid with an alcoholic solution of lead acetate.

The potassium salt of linolenic hexahexenamide was prepared by neutralizing the free acid, dissolved in an organic solvent, with an alcoholic solution of potassium hydroxide.

From the potassium salt of linolenic hexahexenamide, the barium and zinc salts were prepared.

The solubility of linolenic hexahexenamide and of the potassium, barium, zinc, and lead salts of this acid was determined for various solvents. The melting point of these compounds was also determined.


BRACONIDAE: CHELONINAE OF THE PHILIPPINES, MALAYA, AND AUSTRALIA

L. CHELONIN (GUEYF CHELONIN)

BY CHARLES PUCKET BAKER

Of Los Baños, Philippine Islands

Field work in Malaya and the Philippines, extending through fourteen years, shows this important group to be highly developed, and abundant everywhere in those regions in both species and individuals. There have been described previously from the entire Orient (southeast Asia, the Malayan, Malayan, and Papuan Archipelagoes, and Australia) some fifty species in the subfamily Cheloninae; but it is not difficult to find more than that number in any one good locality in the Philippines—practically all unknown up to this time. Some members of the group play a very large part in the economy of Nature, as for instance in the case of the Cotes: described below which may easily be reared by thousands from Crotalus binatus at Los Baños.

This group presents an excellent example of the fact that a classification of sorts may be a very ready possibility when but a few specimens of a few species are known, but that often it becomes very difficult with large series of specimens and species. Such series may show at once that some of the characters previously used for separation of species and even genera are highly variable, and cannot be employed for such purposes. Coloration is highly variable and descriptions based only on color characters are usually quite useless. For instance, bred series show that some species, with the abdomen yellow-marked in the females, have entirely black males; also that the extent of black markings in largely ferruginous species is highly variable. At the same time, the range of coloration in the subfamily is not great and many species are practically identical in

1 Of this species covering certain groups of the known species parasitized, the paper on the Haplopus (except Haplopus) was published in Philip. Journe. Sci. Vol. xii (1913) 251-257. The second paper, on the genus Haplopus, was published in Philip. Journe. Sci. Vol. xvi (1917) 383-387.

421
coloration. Also, in certain structural characters there is often wide variation, as in some of the minute details of the very coarse multiplication. For the same reason, certain details of wing venation cannot be used for synoptical purposes. The insertion of the recurrent nervure is highly variable and may vary from interstitial to distinctly entering the first or second cubital cell, in the same species. In the female, antennae of sixteen joints are rather regularly of this number, but both male and female antennae of more numerous joints are usually variable by several joints more or less. The dentation of the apex of the abdomen is a sexual character, as is also the elongation of the palpi. In some genera the antennae in the female (especially when sixjointed) are shorter and more torted than in the male, but in other cases are very similar to those of the male. Thus, the characters given for Articulenta Viereck, Microtachina Sarg., Chlamyda Sarg., Rithuna Sarg., and Neophanorota Sarg., are either merely sexual characters of narrow group value, or characters that vary widely in every possible combination among closely related species. In a large series of species of tropical oriental Phasmidota, the characters given by Sperlingi for Neophanorota have no generic value, occurring in every possible gradation and combination.

Gastrophilus Guerin has a cyclothamiius mouth and must be referred to the cyclothamiius series as noted by Bruno. The true position of Procyctopus Guerin, described from Australia, as having a pediota abdomen, is also problematical.

An attempt is made herein to arrange the material now in hand. Certain very strongly divergent types which do not appear to be referable to any older genera are here separated as distinct genera, the ensemble of characters of diagnostic value being entirely distinctive, but extensive new material from New Guinea, Central Africa, or some other unexplored region may submerge these, just as the present extensive material renders Neophanorota and certain others quite meaningless.

In the following descriptions an attempt is made to consider only characters of diagnostic value, and to avoid unnecessary detailing of characters common to the subfamily, the tribe, or the genus. Thus the palpi are generally, throughout the subfamily, stramineous or yellowish in color and exceptions are very rare, there being only two among the species mentioned.

in this paper: namely, Aeapopter polyplis Simpson and A. intricata sp. nov. Also, as a general rule, the second transverse cubital nervure is decolored and commonly suffused with whitish; in only four of the species herein it is fully colored; namely, Megathelidae uniformia sp. nov., M. bidentigera sp. nov., Aeapopter incognito sp. nov., and A. intricata sp. nov. In the vast majority of species the hind coxae are smooth, with sparse minute punctures; only in the genus Aeapopter are they more heavily sculptured. All species are dubious with more or less of whitish pubescence; ordinarily this is denser on face, pronotum, apex of abdomen, and thin and hard; usually it does not offer any very clear diagnostic distinctions, though it does so rarely, as in Megathelidae.

Synopsis of tribe of Chelone.

a' Abdominal habits small, the tergum s a solid carapace. Chelone, a. Abdomen usually with two distinct setae (the second said to be chelone in Scudder). first setae of calus usually present.

b. abdomen shorter than head and thorax together, most strongly elongately narrowed below, but subcylindrical in outline, the third segment not broader than the quadrate second; second calus usually elongate rectangular, usually triangular; head elongated Sphenereus.

b' abdomen longer than head and thorax together, most strongly elongately narrowed below, closer in outline, the third segment greatly elongated, broader than the long transverse second segment and very broadly rounded and deep spiny; second calus usually elongate rectangular; head very strongly translucent. Sphenereus

Synopsis of genera of Indobipalpae-Australian Cuthone.

a. First setae of calus absent, first calus and first dorsal calus therefore confluent; eye present.

b. Viewed from above the interocular width is but little greater than the width of an eye and the frons is distinctly scarcely rounded beyond eye; head slightly protruding from outermost margin; posterior face of pronotum not separated from scutum face by a transverse sulcus. Antenna not elongate and strongly elongate, though otherwise of normal Chelone form; abdomen subparallel-sided and distinctly longer than thorax; first setae of calus distinctly shorter or shorter than second; nervure very far punctured (to 1 to 1 of first setae of dorsal); antennae (female) 6, could be divided; size medium to large. *Acanthobus* sp. nov.

*Trachypus* Guert of Australia is not included in this tribe.
Viewed from above, the interocular width is always distinctly greater than the width of an eye and the front is little if any extended; head distinctly transverse, prone strongly narrowed above, the antennal scrobes reaching near to orbital margins; posterior face of prothorax always separated from superior face by a transverse rim.

d. Head large, markedly transversely subcylindric because of very prominent eyes, and much broader than thorax; the vertex usually distinctly conus-like between eyes; inner orbit usually rapidly diverging apically; stigma very large and broad; first antennae of males as long or longer than second; antennae shortly postero-lateral (to 1°) first antennae of distomolars); male carapace with apical spines and more or less acute apically; female usually with apical teeth, the ventral margin being extended to apex; middle of carapace also distinctly concave; antennae (female) 13-jointed

Megatoxaura g. nov.

d. Head normal (for Cladosea) except as all present; inner orbit subcylindrical; stigma normal; antennae (female) 13-jointed (to Malayan species)

Christina Jorco

d. First antenna of malaenes present, other absent

e. First transverse carinal straight or nearly so; first antennae of males shorter than body; carinulae far posteriori; stigma short and deep; prostigma strongly developed; subalar veins arising near apex of discoidal.

c. Median scutal fur in advance of lateral; head always sculptured very differently from mesonotum; mesoscutum rather broadly rounded apically, neither lateral nor apical borders of scutum with largely developed deltoid; none of present species with acutely pointed elytra, the ventral cavity in all cases broadly reaching apex, transverse sin. of procoxae without large teeth, each tooth small or wanting; elytra arising from procoxae; abdomen always shorter than head and thorax together (so to Malayan species)

Anogaster Wymanai

e. Median scutal fur in advance of lateral; head always sculptured very differently from mesonotum; mesoscutum rather broadly rounded apically, neither lateral nor apical borders of scutum with largely developed deltoid; abdomen acutely pointed, the ventral cavity in all cases broadly reaching apex, transverse sin. of procoxae without large teeth, each tooth small or wanting; elytra arising from procoxae; abdomen always shorter than head and thorax together (so to Malayan species)

Anogaster g. nov.

e. First transverse carinal strongly arched toward stigma; first antennae of males distinctly shorter than second; carinulae very shortly posteriori; stigma long horizontal; prostigma subcylindrical but anterior surface here; subalar veins arising far above apex of discoidal; very large, slenderly-suggest species, with elytra arising from head in both male and female, abdomen longer than head and thorax together, prostigma unsculptured.

Megatoxaura g. nov.
Genus CECIUSCHENUS novum

This segregate differs from Chelonia as stated in the synopsis above. The calcar of head and strongly elongate form at once distinguish it. Of Chelonia with eyes not at all prominent, none have the gene above and the cephalic region as strongly developed; the distance from superior orbit to occipital margin about equals the width of eye. Although not at all prominent, the eyes are large and distinctly long elliptical; male space not half length of eye. Mandible palp 1-jointed, last four joints long and slender, progressively slenderer, subequal in length, reaching to fore coxae. Labial palp 4-jointed, second joint strongly swollen, rounded extended apically beyond insertion of third which is a little swollen apically and one-half length of fourth. The posterior face of propodeum is not separated from the superior surface by a transverse carinate ridge, and the surface is evenly sloping from metanotum to insertion of abdomen; abdomen broadly rounded as in Chelonia, the ventral cavity not reaching apex. The straight sides of abdomen are characteristic of both sexes. Pronotum very long, nearly twice the length of fore coxae, uniformly coarsely foveolate, mediadly fine sinuate.

Type, Ceciushenius lazoensis sp. nov.

In fourteen years of collecting no representatives of this genus have been encountered elsewhere than on Mount Maquil, central Louisi.

Synopsis of species of Ceciushenius p. nov.

a. Preosti gynaecum; wing concolorously unbranched at middle; abdomen broadly yellowish as basal half.............. 6. novus sp. nov.
   b. Preosti black; wing hyaline basally but not white distally at middle; abdomen black above............................................. 6. ustulatus sp. nov.

Ceciushenius lazoensis sp. nov.

Length, female, 6.2 millimeters; male, 5.

Female—Black; abdomen on basal half with a broad yellowish transverse band, this band straight-edged posteriorly, anteriorly irregular and not reaching base; antennae with scape, antennulus, and base of third joint ferruginous, remainder piceous. Mandibles ferrugineous. Wings deeply infumated apically, stigma and veins dark, preosti yellowish, a white transverse fascia extending across the wing from preosti; in this band the recurrent nervure and second abscission of discoidal are white; extreme base of median vein and second
transverse ephial devided. The male differs in having the
abdominal band somewhat obscured, more of the flagellum ba-
tedly ferruginous, the fore legs entirely ferruginous, the middle
legs with ferruginous tarsi, tibia, and apices of femora, and
the hind legs with ferruginous tarsi and a pale annulus near
base of tibia. Short silvery pile thicker on legs and thorax.
General color of wing paler, veins paler.
Clipses in female rather strongly and closely punctate, an-
terior margin medially short toothed. Face coarsely rugose-
punctate, above with a short broad salinus between bases of
antennae; scales rather deeply excavated, smooth, shining, and
remotely large punctate within, no median carina, carinately
vinned only below. Genae obliquely coarsely rugose-punctate.
Vertex with irregular crowded punctures and pits of very vari-
able size, the rugae separating them smooth and shining. Mes-
notum medially on basal half with very large crowded foveola,
those at extreme base longitudinally arranged, and with a line
of such foveola marking the course of notauli: lateral areas
and the anterior half shining and with separated coarse punc-
tures. Scutellum with small separated punctures mediately, an-
teriorly semicircular. Propodeum entirely, very coarsely,
depth, and uniformly foveolate, including the posterior face—as
are also the mesopleurae. Carapace with the humeral angles
sharply prominent and the humeral ridges extending straight
caudad, between them some six equally strong cuspules; on
posterior two-thirds of tegumen the sculpturation becomes a
rather fine rugose punctuation without longitudinal trend, the
foveola having crowded secondary pits. Antenna reaching to
middle of tegumen, 45-jointed, strongly tapering apically; an-
tennia very short, about one-fifth length of first antennal joint,
the latter not as long as and about half width of scape. The
male differs in having the repetitions of two distinctly transverse
and the short superior median salinus absent. Antenna of same
form as in female but 34- to 37-jointed. Rugae of posterior
two-thirds of tegumen distinctly longitudinal, ventral cavity
reaching much nearer apex than in female. First abscissa of
radius distinctly shorter than second, and hardly as long as
transverse cubitus. Nervulus postocular to one-third of first
abscissa of discoidal.
Mount Maquiling, central Luzon (Behr).
Baker: Bronchoidea-Callidae

Caboboletus tegulans sp. nov.
Length, female, 6 to 7 millimeters; male, 4.5.

Female.—Black; venter yellowish and this showing through very slightly at sides near base of tergum; antennae with scapes and annelida ferrugineous, flagellum piceus; mandibles ferrugineous, tips black. Fore legs with tarsi, tibia, and apices of femora ferrugineus, remainder of femora and tibia piceus; middle and hind legs except hind coxae, piceus. Wings moderately infumated on apical half, hyaline from level of stigma to base; stigma and adjoining veins dark, medius, discoidal, and recurrent nervus paler; prestigma and basal vein very dark; extreme base of median vein and second transverse cubital decolorized. The male differs only in having the middle legs like the fore legs, the femora and coxae of both being also ferrugineus.

Structurally differing from C. jacunma as follows: Clypeus with punctures very variable in size, some of the anterior ossicles into irregular pits; face also with two distinct, short, longitudinal, shallow, submedian depressions which divide the face at middle into thirds; antennae not so strongly tapering as in C. jacunma and somewhat longer. The male has the clypeus much less strongly punctured, with no punctures enclosing; tergum with basal Coxae and the fossulae between them much larger and deeper. First abscia of radius distinctly shorter than the rather short second abscissus, the latter subequal to the second transverse cubitus. Nervula as in C. jacunma.

Genus MEDACEOCHLONUS novus

Viewed from above, the distance between the prominent eye is much greater than the width of an eye, and the anterior transverse border of face (as seen from above) is nearly straight, the front not at all extended; the face in corresponding breadth, much broader than long; in lateral view the eye is distinctly long elliptical or oval, the male eye not as long as an eye is broad, and not greater than half its length. Maxillary palp similar to those of Caboboletus but, due to the far shorter prostomium, reaching to hind border of fore coxae. Labial palp with third joint inserted at apex of the somewhat swollen
second. Abdomen not longer than thorax, general form normally chelonoid in female, somewhat spinoid-shaped and more or less acute apically in male. Posterior face of propodeum abruptly declivous, concave, separated from upper face by a prominent carinate rim, which is laterally and sinuately more or less strongly toothed. Prosternum small, narrowly oval and a half times length of fore coxa, median subscutum broad and deep, finished by very large forewings.

The sexual characters of this group are very marked; the males have a distinctly shaped apical aperture in the carapace; in the females the ventral concavity usually reaches the apex and there has its bounding apical angle toothed; rarely the ventral cavity does not reach apex and is normally cheloneid.

In all of the species, the thorax has a rather pronounced grayish cast, due to the rather thick cuticle oppressed pile.

Type, Megachelesus bidensifer sp. nov.

Synopses of species of Megachelesus sp. nov.

**FEMALES**

1. Abdomen very deep spinoidly and has broadly rounded, not bidentate at apex, the ventral cavity far from reaching apex; median carinae weak, only parietal or straight, their rear free and uniform, forming no connected and distinctly longitudinal reticulum in the middle third; pretarsus antennae; male mouth notches; length, 1 millimeter. — M. equilaterus sp. nov.
2. Abdomen of equal depth throughout as seen from side, the ventral cavity reaching apex and there with the terminal lateral angles strongly papily dentate; median carinae lying between distinctly fringed plates; entire frons. — M. equilateralus sp. nov.
3. Carapace black throughout. — M. bidensifer sp. nov.
4. Antennae 12-jointed; small species, length, 5.5 millimeters; apical opening of ventral cavity distinctly ventral, the apex of carapace closely rounded above it. — M. bidensifer sp. nov.
5. Antennae with uniformly dark ferrugineous fuscopile; hind femora distinctly pale ferrugineous; length, 5.5 millimeters. — M. stenodactylus sp. nov.
6. Antennae with basal half of flagellum pale ferrugineous, apical half pale in strong contrast; hind femora pale at apex; length, 4 millimeters. — M. stenodactylus sp. nov.
7. Antennae more than 12-jointed, large species, length, 5.5 millimeters; apical opening of ventral cavity extended upward and occupying whole apex of the currently extended anteriority of carapace, and before it directly a strong transverse impression. — M. reticulatus sp. nov.
Males

1. Prostigma transversal; frontal aperture semicircular.
2. Abdomen basally broadly yellow; radial cell indurate; length, 6.6 millimetres. *M. bidentata* sp. nov.
3. Abdomen black; radial cell hyaline; length, 6 millimetres. *M. rugosiceps* sp. nov.
4. Prostigma green; frontal aperture circular; abdomen black; length, 6 to 6.2 millimetres. *M. seminana* sp. nov.

**Mepalboma seminana** sp. nov.

Length, female, 2 millimetres.

*Female.* Black; abdomen with entire basal third yellowish; scape, scape, and most of first flagellar joint yellowish; remainder of flagellum dark brownish-grey. Mandibles yellowish. Hind legs picose, optoc of coxa, trochanters, extreme bases of femora, and tarsi dark yellowish; middle and fore legs dark yellowish throughout. Wings hyaline with region of radial cell somewhat infumated; prostigma, costa, and basal and median veins yellowish, remaining veins dark but nose so dark as stigma; tegula yellowish.

Clavus closely, finely punctured basally, apically more coarsely and sparsely, the middle third of anterior margin slightly, roundly extended. Face finely, densely, uniformly rugose-punctate, with a very short, smooth median carina at base. Scape sharply margined below and between antennae, divided medially by an obsolete longitudinal ridge, the basins longitudinally wrinkled at extreme sides, within and above minutely, shallowly sculptured, and rather sharply narrowed above. Ge-

no densely, obliquely wrinkled. Vertex transversely wrinkled, becoming sculptate in the occipital area. Posterior ocelli widely separated, the distance between their outer margins being equal to the ocellar distance. Nasal extending to base, marked by a row of large foveae larger at base, between these with two longitudinal rows of large foveae on either side of a rough but strong median carina which with its flanking foveae is incurrent. Lateral basal areas of macro-

notum punctate, submedian anterior areas weakly transversely rugose. Scutellum basally excavate, centrally smooth and shining, minutely but very sparsely punctate. Propodeum with a very strongly marked deeply excavate median subtriangular area, its apical margin deeply depressed and emarginate, its lateral apical angles projecting over posterior face as two very stout protuberant teeth; posterior lateral angles of propodeum
nervous than in female, and more teretely fimbriate. First and second abscissae of radius subequal, the second transverse cubital a little shorter. Nervula postfurcal to one-fourth of the first abscissa of disoidal.

Singapore (Dunker).

Megaphorus megophthalmus sp. nov.

Length, male 6 millimeters.

Male.—Dull, without yellow on abdomen, either above or below. Antennae basally very dark ferruginous, becoming picous apically. Mandibles very dark ferruginous; legs pale ferruginous; apical two-thirds of hind femora and all hind tarsi picous. Wings hyaline, stigma, costa, and basal and median veins pale yellowish; remaining veins progressively darker but never as dark as stigma. Tegulae ferruginous.

Clypeus smooth and shining, very sparsely punctate, the anterior margin broadly arcuate. Face with median carina indistinct apically, basally strongly, sharply raised, and persistent between scrobes; surface of face transversely (at sides obliquely) crenate, shallowly, irregularly rugose. Scrobes sharp-margined at sides and below, smooth and shining within, shallow sulci between scrobes and orbita. Genae with several strong irregular rugae near eyes, remainder of surface very indistinctly rugose. Vertex not concave, distinctly, shallowly, enface, raised with some small punctures; total width of occipital area about equal to peduncular width. Sculpturation of thorax and abdomen very similar to that of M. bidestritus; triangular area of propodeum deeply impressed and very broad apically. Form of abdomen very similar to that of M. bidestritus except that, as viewed from side, there is a slight extension of the apex below the aperture. Apical aperture as in M. bidestritus. First abscissa of radius distinctly longer than second, the latter a little longer than second transverse cubital. Nervula postfurcal to one-fourth first abscissa of disoidal.

Sulugan, northeastern Mindanao (Dunker).

This is the largest species of the genus.

Megaphorus enantiopus sp. nov.

Length, male 4 to 4.5 millimeters.

Black, without yellow on abdomen, either above or below. Antennae with scape, annulus, and flagellum basally brown.

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pale ferruginous, remainder very dark ferruginous. Legs pale ferruginous, apical halves of hind tibia, and hind tarsi pigmented. Wings hyaline, the median vein stramineous, remainder, including basal, dark, the stigma and post stigma very dark. Tegum ferruginous.

 Clypeus rather closely, coarsely punctured, anterior margin broadly arcuate; face with large, deep foveole separated by high sharp rugae, larger and more irregular near clypeus; the upper showing a tendency to transverse arrangement; no indication of median carina. Scrobes separated by a high and strong carina, highest between antennae, the entire inner surface of scrobes coarsely foveolate; one high, strong, longitudinal ruga between scrobes and orbit. Vertex with very strong pentagonal and reniform foveoles, the entire width of occipital area subequal to the occipital width. Gene entirely very coarsely foveolate, the foveole near eye longitudinally arranged. Entire mesonotum coarsely foveolate, those on median basal area very strong and deep and arranged in four longitudinal rows, those elsewhere shallower and more irregular. Scutellum basally quinquesecondate, the middle area occupied by about six large foveae. Propodeum very short at middle, the median area high-rimmed, deeply depressed, very broad apically and within with but two transverse rows of very large foveae, two basal and five apical; except for the broad, deep excision of the median area, the hind margin of upper and lateral faces broadly, lamellately expanded caudad and with laminae broad bounding median area and at lateral angles; the deeply excavated posterior face thickly covered with subcircular foveoles. Abdomen narrowly subelliptical in outline, gradually narrowed to a subacute apex. this appearance produced by a slight extension below the apical curvature; viewed from the side the abdomen is somewhat deeper apically than basally. Ventral cavity falling far short of reaching apex. Apical apertures subcircular. Antennae 25-jointed, the flagellum evenly, teretically elongate, acute at tips. First section of radius distinctly longer than second and the latter subequal to second transverse cubital. Neuviusia shortly postfurcal.

Singapore (Riker).

During the days when this species was taken, males were common on the wing, but not a female was seen. A great excess of males is a rare occurrence in this subfamily.
Baker: Brunnula-Celoninae

pale ferrugineus, remainder very dark ferrugineous. Legs pale ferrugineous, apical halves of hind tibiae, and hind tarsi picaceous. Wings hyaline, the median veins stramineous, remainder, including basal, dark, the stigma and pre stigma very dark. Tegulae ferrugineous.

 Clypeus rather crenate, coarsely punctured, anterior margin broadly arcuate; face with large, deep foveole separated by high sharp rugae, larger and more irregular near Clypeus; the upper showing a tendency to transverse arrangement; no indication of median carina. Scrobes separated by a high and strong carina, highest between antennae, the entire inner surface of scrobes coarsely foveolate; one high, strong, longitudinal ruga between scrobes and orbit. Vertex with very strong pentagonal and angulocarinate foveole, the entire width of occipital area subequal to the section of the width. Genae entirely very coarsely foveolate, the foveoles near eye longitudinally arranged. Entire mesonotum coarsely foveolate, those on median basal area very strong and deep and arranged in four longitudinal rows, those elsewhere shallower and more irregular. Scutellum basally quinquedepressed, the middle area occupied by about six large foveae. Propodeum very short at middle, the median area high-rimmed, deeply depressed, very broad apically and within with but two transverse rows of very large foveae, two basal and five apical; except for the broad, deep emargination of the median area, the hind margin of upper and lateral faces broadly, laminately expanded caudad and with laminate teeth bounding median area and at lateral angles; the deeply excavated posterior face thickly covered with subscutellar foveola. Abdomen narrowly subelliptical in outline, gradually narrowed to a sub-acute apex, this appearance produced by a slight extension below the apical aperture; viewed from the side the abdomen is somewhat deeper apically than basally. Ventral cavity falling far short of reaching apex. Apical aperture subcircular. Antennae 25-jointed, the flagellum ovately, terebrally flattened. Acute at tip. First ochrea of radius distinctly longer than second and the latter subequal to second transverse calibar. Nervulus shortly postfurcal.

Singapore (Baker).

During the days when this species was taken, males were common on the wing, but not a female was seen. A great excess of males is a rare occurrence in this subfamily.
Megaobscura uniforma sp. nov.

Length, female, 5.6 millimeters.

Female.—Black, abdomen without yellow; scape and annulus pale ferruginous. Flagellum very dark ferruginous. Legs yellowish, hind tarsi piceous. Wing hyaline, veins pale stramineous, costa, preapex, stigma, and radial vein clear brown.

Terpnis stramineus.

Chyssus with separated coarse punctures, the anterior margin broadly arcuate. Face coarsely, irregularly, deeply foveolate throughout but with a distinct puncturee median carina, this carina continued to separate the scrobes, very high below and between antennae, low above. Scrobes smooth and shining within, some irregular foveoleae next median carina, sharply-rimmed below and with one high, sharp, longitudinal ruga between scrobes and orbit. Geno obliquely rugose punctate. Vertex a little concolor, very short, the occipital slope beginning just behind lateral ocelli, small foveoleae throughout, over-all scalar width subequal to ocellar distance. Thoracic sculpeature in M. bicinctus, except that scutellum is centrally irregularly foveolate; lateral teeth of propodeum far larger and more strongly protuberant than the submargin. Tergum with humeral carinae hardly distinguishable except at extreme base, the surface with numerous longitudinal punctures (on basal half) costate, the foveole between them having a tendency to be quadrangular on basal half, apically the costulae and much smaller foveoleae are very irregular. Abdomen, viewed from side of uniform depth throughout, ventral concavity narrowly continued to apex where its bounding angles are protuberantly, distinctly toothed. Antennae 16-jointed, apical third distinctly flattened and broadened. Nevusulus very shortly postfurcal; first abscissa of radius distinctly longer than second abscissa or second transverse cubitus, the latter two subequal, the last not decurved.

Lee Bensu, Luzon (Baler).

This is the smallest species of the genus. A fully colored, second transverse cubital nerve is very unusual in this subfamily.

Megaobscura bicinctus sp. nov.

Length, female, 4 millimeters.

Female.—Black, abdomen without yellow markings. Scape and basal half of flagellum pale ferruginous, apical half piceous. Legs pale ferruginous; hind coxae except apices and apical third...
of hind tibiae picoseon. Wings hyaline, costa and basal and median veins very pale, remaining veins and stigma much darker. Tegula stramineous.

Claw with acute, separated punctures and with a few short, oblique rugae at external side. Face coarsely foveolate and with many punctures, the foveole large, shallow anteriorly, much deeper on upper half of face where the high strong separating rugae become markedly transverse; rugae also form an irregular but strong median carina. Scrobes separated by a low median carina and very broadly extended to the high sharp rugae near orbits (this rugae reaching lateral ocellus), the inner surface smooth and shining, largely occupied by separated, rounded foveae of varying sizes. Time and vertex coarsely foveolate. Mesonotum strongly granulif because of appressed pubescence which obscures the sculpture. Notauli deeply foveolate to half length of mesonotum, the foveole being crenulate; between bases of notauli with two short longitudinal rows of large, partially confluent foveole; anterior median area thickly punctate and with two distinct, shallow, longitudinal depressions, a small inter-homal area punctate, remainder shallowly small foveolate. Stretchen quinge foveolate at base, the three median basal foveae extended as deep, sharp-rimmed channels, posteriorly across median area. Propodeum very coarsely foveolate, the median area deeply depressed and very broad apically, its posterior notch and lateral angles of propodeum dentately produced. Mesopleura entirely occupied by very large and deep, mostly regularly transverse foveae. Abdomen about as long as head and thorax together. Dorsum with humeral carinae not distinguishable from the many, very strong, straight costate, their rims thick and occasionally punctate, and extending to two-thirds length of carapace. Ventral cavity, by a narrow channel, open to apex, there flanked by two short, perfect teeth. Antenna 16-jointed, the flagellum distinctly flattened and broadened on apical half. First antennal of radius subequal to second, the second transverse ocellal distinctly shorter and not denticulate. Normal very shortly posteroventral.

Tanglekula, Bicol Province, Mindanao (Baker).

Repsocoleus reticulatus sp. nov.

Length, female, 8.5 millimeters.

Female.—Black; abdomen without yellow markings. Scape and pedicel pale ferrugineous, flagellum picoseon. Legs pale ferrugineous, anterior paler, hind coxae and tibie somewhat
darkest, kind taro pieces. Wings hyaline, all veins very pale except costa, radius, and second abscissa of cubitus which are pale brown like the stigma. Tegulae pale ferrugineous.
Cypaeus rather thickly coarsely punctate, somewhat rugose at extreme sides, and with anterior margin rather narrowly rounded. Face coarsely, deeply, transversely (at the sides obliquely) rugose and medially foveolate, without a median carina. Stereae separated by a low median carina, the inner surface smooth and shining, obscurely transversely wrinkled; between striae and orbits, three strong rugae. Genae obliquely rugoso-punctate, punctures thicker near orbit. Vertex somewhat longitudinally rugoso-foveolate. Notauli marked by large deep foveae; while mesomeron elsewhere with smaller irregular foveola of varying sizes. Scutellum basally with six large somewhat irregular foveae, the median area bordered all around by deep foveae, the disk coarsely punctured and very small foveolate. Propodeum very coarsely, deeply foveolate, the median area of the narrower type, encroclose, not very wide or deeply depressed apically; apical angles very obtusely dentate, so are also lateral angles of propodeum. Pleura entirely coarsely foveolate. Dorsum of carapace with numerous costulae at base, but these soon broken up, forming a great number of elongate, compound foveolae; the depression before the distinctly extended apex is longitudinally rugose. The spiral opening of ventral cavity is very well on the dorsal surface of the extended apex where it is preceded by a strong transverse impression; the epigynium is straightly, correctly exserted from this opening; the sides of the apical opening below, at epigynae of side of ventral cavity, are thickly, shortly, dentately extended, but the teeth are thus lateral and not submedian as in other species. Antennae 13-jointed (broken in the type), the flagellum evidently but very slightly elongated apically. First abscissa of radius slightly longer than second, the latter distinctly longer than second transverse cubital. Nervures postfurcal to one-third of first abscissa of diapical.
Mount Banahas, Laguna Province, Luzon (Baker)
This species presents an extreme development of the genital opening that is not duplicated in any other chelaeid known to me. It is also very distinct in its other characters.

Genus ASCOMASTER Westral
This genus is composed largely of species which closely resemble Chelaeus of the various groups of that genus, differing
most strikingly in the presence of the first abscission of calciuli; but, in addition, it includes some species of quite distinct structure. It apparently is not a natural group, even as bare delimited, and rapidly accumulating material will necessitate a recast of the whole complex at some early date.

The Australian species, as far as known, differ from the Malayan very strikingly, in having the sculpture of head and thorax tending toward simple penetration instead of formlation or rugose penetration. The appendages of the Australian species are also commonly darker than in the Malayan species; but they apparently differ most widely in the antennal scales, which usually present simple depressed surfaces sculptured like the vertex, instead of the delimited and differently sculptured cavities of the Malayan species.

Moritz described two Australian (New South Wales) and one Papuan species, synonymizing them entirely on color characters, and presenting very incomplete descriptions. I have included these in the following synopsis on such characters as were given, even though it weakens the synopsis to do so. Pull-aways described two Javaan species; his descriptions are much longer than those of Moritz, but are still more difficult to use, since the majority of the characters described are those of the genus, tribe, or subfamily, and therefore the specific position is uncertain.

**Synopsis of species of Assamaster Werneri.**

a'. Antennal scales distinctly delimited by cuticular rings, the interior segmentation different from the exterior, montmorianum densely sculptured; vertex usually formlated like the mesonotum; scutellar pale in Malayan species.

b'. Nervaeae shortly pectinately, first abscission of radius as long as or very little longer than second, usually subacute species of short, compact form.

c'. Abdomen with more or less yellow at base; a small smoky cloud below the dark stigma.

d'. Yellow of tegmina bright and clear, occupying a large part of basal third; clypeus nearly peltate throughout; male, length, 2.25 millimeters, &. amblydeorum sp. nov.

de'. Yellow of tegmina as obscure transverse mark at extreme base, clypeus with large median basal row imputicate; male, length, 2.25 millimeters, &. darseni sp. nov.

e'. Abdomen black (male); antennae marked by broad lines of forewings; male, length, 5 millimeters, &. squamosus Pullavy.

*Journ. Straits Arch. Soc. 80 (1892) 59.*
*Pacifica doubtful.*
6. Nervulae long postfovea; first abscia of radius considerably longer than second; head seen from above with eyes very broad behind eyes.

7. Stigma pale, an analytically divided in, white all pale; sculptura of head and thorax prominently foliaceous and rufous; legs bright yellow. A. lepida sp. nov.

8. Stigma dark, with a fuscous cloud beneath it. A. ventralis; sculpturation of head and thorax prominently foliaceous; legs very dark; sculpture of head and thorax prominently foliaceous; male, length, 6 to 6.5 millimeters; female, 4 millimeters.

9. Stigmas not divided by carinate rings, inferior sculpture, at least above, none as that of adjoining surface; vertex greatly prominent; vertex usually very dark. Australian and Papuan species.

10. Head black.

11. Head fuscous-erumpent.

12. Head transverse, strongly narrowing behind eyes as seen from above.

13. Small species, length, 3.5 to 3.8 millimeters.

14. Small size; vertex, mesonotum, metanotum, and dorsum very; stigmas (male) nearly straight-average anteriorly and with a median spur; male, length, 1.5 millimeters.

15. Not distinctly visible; mesonotum transverse at middle; mesonotum punctate; dorsum "fusco-opaque." A. spinosa (male) acute-average anteriorly; male, length, 3.5 millimeters.

16. Very large species; female, length, 5 millimeters; abdomen "attractiva." A. atrolineata Cuvier.

17. Head subequal to eyes, as seen from above, with a very prominent eye, and the rest (to outside) as wide as across eye; tegula, scutum, pugil, and abdomen black; male, length, 4.3 millimeters.

18. Tegulae and pugiliform rings in pale yellowish; head rugosely-eruptive.

19. Wings large, hyaline, beneath stigma not distinct, fuscous cloud.

20. Dorsum sculptured throughout; male, length, 3.5 millimeters.

21. Tegulae and pugiliform rings in pale yellowish; head rugosely-eruptive.

22. Wings large, hyaline, beneath stigma an indistinct fuscous cloud.

23. Dorsum sculptured throughout; male, length, 3.5 millimeters.

24. Tegulae and pugiliform rings in pale yellowish; head rugosely-eruptive.

25. Wings large, hyaline, beneath stigma an indistinct fuscous cloud.

*Patella doubtful.
Baker: Bronnidae-Cheloniidae

a. Wings largely infuscated, usually more deeply so in region of radial cell and basal stigma.
b. Wing with brown or vinaceous transverse white line running from postmedian to radius; length, female, 3 millimeters. 4. sylvata Sp. nov.
c. Wing without transverse white line.
d. Male distinctly; abdomen (male) yellow at base; metasome (male) 25-jointed; mesonotum black; femora purple; metatibiae shaggy; basal spiniform annules; male, length, 2 millimeters. 5. proteropterus Sp. nov.
e. Male indistinct; abdomen (female) 15-jointed; metasoma red-brown; metatibiae purplish; apical segment of cercus (female) elongate; genital sacculus long as long as abdomen and pedipalps together; hand with yellowish; female, length, 4 millimeters. 6. volutata Sp. nov.
f. Hand entirely or largely bright ferruginous.
g. Apex of abdomen entirely smooth and shining; basal half of male brown yellow.
h. Vertex thinly grey-purple; hind tibia nearly all black; male, length, 2.5 millimeters. 7. nivosa Sp. nov.
i. Vertex transversely rugose; with few weak proscutellae; hind tibia all yellowish; male, length, 2.5 millimeters. 7. nivosa Sp. nov.
j. Apex of abdomen sculptured throughout.
k. Hand entirely smooth; vertex transversely rugose-purple.
l. Hind legs largely purple; wings rather strongly infuscated and with a brownish transverse band extending from between postmedian and stigma, which does not involve the veins (shawn); fore abdomen somewhat longer than second transverse cubital suture; metasoma smooth and shining with very sparse minute punctures; mesonotum basally without median carina; abdomen black; male, length, 3 millimeters. 8. sp. nov.
m. Hind legs pale-yellowish like others; wings less infuscated and having broad, transverse transverse lines; first abdomen subequal to second transverse cubital.

9. Scutellum smooth and shining, with very sparse punctures; metasoma basally without median carina; abdomen with basal third suffused and very dark ferruginous, this very inconspicuous; female, length, 3.5 millimeters. 9. nitida Sp. nov.
10. Scutellum very usually punctured; mesonotum basally with a strong shiny median carina; abdomen with basal third clear straw-colored; female, length, 3 millimeters. 10. nitida Sp. nov.
11. Hand with the vertex largely black, smoothly punctured; metasoma rugose very strongly shaggy black; hind yellowish throughout, hind tibia which basally 4 millimeters. 12. nitida Sp. nov.
Aenogaster isomoptera sp. nov.

Length, male, 2.75 millimeters.

Black; abdomen with a large yellow spot on basal third of dorsum, extending from side and including whole width of base, but somewhat roundly narrowed apically. Scape pale ferruginous; flagella piceous. Legs straw-colored, hind coxa straw-colored, darker basally; apical third of hind femora, apical half and extreme base of hind tibia, and base of hind tarsus piceous. Wings hyaline, the veins pale brown, costa and stigma darker, basal vein and first abscissa of cubitus paler. Tegula dark ferrugineous.

 Clypeus very coarsely punctate, apically narrowly acuate. Face very coarsely rugose, the rugosities in large part very strongly oblique—downward and mesial; a strong median carina persistent to near clypeus, the surface on either side of this basally depressed, more broadly so at extreme base and this area transversely rugose. Lower rims of antennal sockets raised anteriorly into blunt dentate projections. Major space long, about equal to width of eye. Genae very coarsely longitudinally rugose. Vertex and temples very coarsely, deeply foveolate. Entire mesonotum very strongly deeply foveolate, the foveolate small on anterior medial area, the notauli not distinguishable. Scutellum very coarsely quadrifoveate at base, median area coarsely rugose. Propodeum covered with very large, deep foveae, the posterior rim with very strong blunt teeth submedially and laterally. Pleurae strongly deeply foveolate. Dorsum very coarsely longitudinally foveolate, the larger foveolate with numerous smaller foveolate within. Viewed from side the abdomen is about as long as thorax, very gradually deeper apically where it is broadly rounded; ventral cavity reaching nearly to apex. Antennae 33-jointed, about as long as body, the flagella rather stout, strongly tapering on apical fourth. First abscissa of radius slightly longer than second, the latter about equaling the unadorned second transverse subdistal; nervulus pascutellaris to one-fourth length of first abscissa of discoidal third abscissa of radius nearly straight.

Cotabato Mountains, Oriental Mindoro (Baker).

Aenogaster lazennii sp. nov.

At Los Buhos, in central Luzon, we found a small species of the same size, same number of antennal joints, and similar type of sculpture which, however, differs in so many details.
that it cannot even be considered as a variety of the Negros form (tenebropus). 

Male—Yellow marking of abdomen reduced to an obscure transverse mark at extreme base. Hind omm very dark ferruginous at base, hind tibiae and tarsi except basally pale picaceous. Wings with stigma and veins all equally pale brownish, the costa darker, second transverse cubitulus not decoloried. Clypeus with large median basal area smooth and shining, impunctate. Facial rugae much stronger and fewer than in the preceding species. Vertex and mesonotum equally very strongly ferruginous. Submedian tooth of posterior rim of propodeum more strongly protuberant. Tergal fossula deeper, narrower, more strongly longitudinal and with fewer interior smaller fossulae. Nervulus very shortly posteroval.

*Anagaster longius*, sp. nov. 

Length, male, 4 millimeters. 

Black; abdomen with a small irregular median yellow spot near base, the venter more extensively yellowish. Scapes pale yellowish, tegulae very dark ferruginous. Legs pale yellowish, the hind tibiae on apical half and extreme base and the hind tarsi picaceous. Mandibles ferruginous, darker at apex. Wings hyaline, stigma and veins pale brownish, second transverse cubital decoloried. Tegulae pale yellowish.

Clypeus roughly, thinly, irregularly punctured, anterior margin medially very broadly rounded. Face very roughly, coarsely, irregularly rugo-foveolate; with a strong but rough, percurrent median carina; parallel to this and to orbits and continued straight apicad from sockets, near two prominent longitudinal rugae, not, however, quite as strong as median carina; between these lateral rugae and the orbits the surface is somewhat concave and weakly but coarsely transversely rugose. Serrae narrow and sharp-margined, one strong longitudinal ruga between margin and orbit. Gossip thick, set with deep rounded foveola, the foveola of vertex larger and more angular. Notauli occupied by very large and broad foveae, between these bases two short longitudinal rows of very large foveae; remainder of mesonotum covered with smaller rounded foveoles, those on anterior median area and lateral basal area very small.

Scutellum quinquiterranea at base, median area coarsely longitudinally rugo-foveolate. Propodeum very coarsely foveolate throughout, the median area strongly broadened apically where
its sides are very strongly obtusely dentate, as are also lateral angles of rim. Mesopleurum thickly, coarsely, rather roundly foveolate. Tergum with the short basal outline soon broken up into shallow foveoles of irregular sizes and shapes and without longitudinal trend. Viewed from side, the abdomen is very gradually deeper to the broadly rounded apex, and not as long as thorax and head together. Antennae 28-jointed and somewhat longer than entire body, basally slightly enlarged on apical half, the tips somewhat alternate. First sections of radius distinctly longer than second, the latter subequal to second transverse cubital. Nervulus shortly postfurcal. Third abdomen distinctly annulate.

Mount Keeling, central Louisi (Baker).

Asquithia philippiana sp. nov.

Length, male 4 to 4.25 millimeters.

Black; tergum with a clear pale yellowish mark extending from entire breadth of base, long triangularly, to two-fifths the length; remainder of tergum may have a very dark foveolose cast. Some pale yellowish below, foveolose above, flagellum piceous. Legs pale yellowish, fore tibia a little darker, pale pieces are middle tibia (except basal annulus) and tarsi, darker picose on upper surface of hind cone and femora, and hind tibia and tarsi except a white annulus near base of tibia. Stigma and veins dark brownish, second transverse cubital denticate; a narrow interruption extending from stigma through second cubital cell. Tegulae dark foveolose.

Ovipositor sparsely coarsely punctate. Face thickly and coarsely but smoothly and deeply punctate, with high, thin median carina on basal half, highest between antennae and recurrent between scrobes; just above antennal insertions there are several short longitudinal ruse between rims of scrobes and orbits. Head subquadratic, the vertex long rounded behind eyes, this extension greater than the over-all occipital width; surface coarsely, sparsely coarsely punctate. Genae smooth and shining, sparsely coarsely punctate. Maxillae without vestiges of clypeus, a few irregular roundish foveae at basal middle, the entire remaining area with very large deep punctures, not very thickly distributed over the shining surface. Scutellum septentrionale at base, the median surface coarsely punctate and with some smooth indistinct longitudinal ruse. Propodeum with large, deep, angular facets throughout, the median area not demarked, the posterior rim very weak, submedian teeth lacking, lateral
Baker: Brevicornis-Choletinus

fifth short and blunt; posterior face sculptured like superior. Terceum on basal third with numerous weak longitudinal cuti-les, on median third with very numerous, elongate, shallow fossa of irregular form, each with smaller fossula within, the larger rims low, thick, and shining; terminal third densely, longitudinally rugose-punctate. Abdomen not quite as long as head and thorax together, viewed from side becoming gradually deeper apically, the apex broadly rounded. Disk of mesepimeron covered with round fossae of varying sizes. First abscission of radius considerably longer than second, this subequal to second transverse cubital; third abscission somewhat acute. Notum postfurcal to one-third of first abscission of discoidal. Antennae 45-jointed, extending beyond abdomen a distance about three-fourths length of abdomen.

Mount Maquiling, central Luzon (Baker). Also taken on Mount Rasahan.

A larger (length, 3 millimeters), heavier-bodied female from Bulusan, Mindanao, must be referred to this species. It has the basal yellow mark of terceum more sharply triangular, and a large round spot on extreme apex of abdomen is somewhat yellowish—though the latter may represent mere aberration. Otherwise the details of structure are very closely similar. The antennae of this Bulusan specimen are unfortunately broken. This is the only Malayan representative of the Australian group in which the sculpture is largely more puncturation. It, however, possesses the characteristic serrae and other features of the Malayan species.

Aenepater intensus sp. nov.

Length, male, 4.5 millimeters.

Black; antennae black throughout, the scape shining, intense black; palpi black. Mandibles nearly black. All oval black, and all tarsi pinnate; middle femora and tibia and hind tibia ferruginous, hind femora strongly reddish. Wings slightly smoky basally, more deeply so apically. Sigma and veins very dark, only the median veins basally paler. Second transverse cubital decollated. Tegulae black.

Clypeus on median area thickly, coarsely punctate, at sides rugose-punctate, the anterior margin narrowly truncate. Fore very short, its breadth about one and a half times the length (apical angle to clypeal surface), densely coarse punctate only on a small middle area, otherwise densely rugose-punc- tate. Scapes very short, not reaching median olivous. Serral
depression not laterally delimited, and rugose-punctate same as the wide vertex; gena behind eye very full and long, as seen from above the head, as wide across base of gena as across eyes; ocular distance much greater than total width of occular area. Mesonotum small foveolate, one depressed basal area with larger transverse foveolae along lines of sutures, the entire remaining surface thickly, coarsely punctate. Scutellum smooth-faced basally, the entire disk coarsely punctate. Propleuron with superior face very short, irregularly foveolate, the moderately deep foveolae of various sizes and shapes, the median area indistinctly outlined, the posterior rim weak and without submedian or lateral teeth, the posterior face strongly oblique and not deeply concave. Dorsum with short, strong humeral carines but without longitudinal costula between, the entire surface densely, very evenly, minutely foveolate, without any longitudinal trend, this uniform to the extreme apex; the apex with a short, projecting, thick, vertical, subshamate keel. Abdomen, viewed from side, as long as head and thorax together, this basally, deepening rapidly on apical half to the broadly rounded apex. Mesosoma largely covered by small, round, separated foveolae. First abscission of radius distinctly longer than second, the latter subequal to second transverse cubitus; third abscission of radius rather strongly upcurved. Nervulus postmedian to one-third of first abscission of discomal. Antenna reaching to middle of abdomen, 27-jointed. Ellawara, New South Wales (H. Petersen).

Evidently related to A. pulsatilis Steiglitz, but that species has black hind femora.

Anagryptus zoekea sp. nov.

Length, female, 9.5 millimeters.

Black; abdomen with basal third pale yellowish, this angularly extended on median line. Scopa, antennae, and first joint of palpless bright fuscous, remainder of fuscous piceous. Legs stramineous, hind coxae and femora black; fore and middle femora, apical third of hind tibia, and hind tarsi more or less distinctly piceous. Mandibles ferrugineous, palpi stramineous, wings hyaline, a slight fuscous tinge below stigma; stigma and most of veins very dark, basal and median veins testaceous, second transverse cubitus deocularized. Tegula testaceous.

Clypeus with most of surface shining, coarsely but very sparsely punctate, more densely and rugosely punctate at extreme sides, the anterior margin narrowly subangulate at mid-
Baker: Bryocentria-chelonias

dio. Face densely, coarsely punctate, somewhat rugosely so toward malar space; straight longitudinal impressions near submedially. Scrobes confluent, not slightly delimited, and with the posterior sculpilation rugosa-punctate like that of vertex. Over-all ocular width much less than ocularlic dis- tance. Head very short behind eye, the gena rapidly nar- rowed to scutellum; length of malar space nearly equal to width of eye; gena rather sparsely coarse punctate. Mesoscutum with large impressed basal area thinly and irregularly, very small foveolate, some foveolae extending along lines of the scarcely impressed axis; remainder of surface thickly coarse punc- tate. Scutellum basally serenate, the disk sparsely coarse punctate. Mesopleura in large part sparsely coarse punctate. Propodeum covered with rounded foveolae of varying size on upper face, the median area sharply outlined, with about eight foveolae within, nearly rectangular in outline and not reach- ing base; posterior rim without submedian tooth and the lateral angles very obtuse; posterior facie nearly vertical, and strongly sculptured. Dorsum with short, strong, oblique humeral carina, but without indication of longitudinal carinae otherwise; entire surface deeply, sharply, minutely foveolate, the foveolae mostly somewhat elongate; this sculpture becomes a coarse rugose-punctate on extreme apex. Abdomen scarcely as long as head and thorax together, viewed from side very gradually deconcoloring to the not strongly rounded apex; the ventral con- cavity extends to apex, and here the ovipositor (in this speci- men) is exerted to more than half the length of abdomen, the hypopygium extended considerably beyond apex. The second joint of maxillary palp is strongly, subangulata dilated at mid- dle. Antenna 26-jointed, the scape rather strongly swollen at middle and reaching lateral occipital; the flagellum much stouter on apical half, then suddenly attenuate in apex. First abscissa of radius but slightly longer than second, second subequal to second transverse cubitus; third abscissa slightly separated. Nervulus postfurcal to one-fourth first abscissa of discoidal.

Botany Bay, New South Wales (Petersen).

This species has the appearance of an ordinary small Chelo- nias, but is very distinct in the details of structure.

Assignata herens, sp. nov.

Length, female, 2.6 millimeters.

Black, with very scant pubescence. Antenna piceous, the scape, annulus, and first joint of flagellum dark ferruginous.
beneath. Legs scrobiliferous, all the femora except more or less at apex and base of each, and hind coxae pleon; middle tibiae darker apically; hind thin and tarsi picaceous. Wings hyaline, slightly infumated beneath stigma, the veins nearly concolorous, paler than stigma, second transverse cubitus dorsofelt. Tegula scrobiliferous.

Clypeus with sparse, coarse punctures, its anterior border somewhat extended and reflexed, also narrowly serrate. Face coarsely rugose-punctate, the trend of rugae being downward and onward; basal half with a distinct median ridge, but this not continued between antennae; the face much wider between orbits than long from antennal sockets to clypeus. Vertex and suture depressed uniformly transversely rugose-punctate, without longitudinal rugae next orbit. Vertex not at all concave, the ocellular distance but slightly more than occular width. Stipes rather short and thick, not reaching lateral ocelli. Maxillae with entire basal depressed area occupied by small, crowded areolae, which are shortly extended along lines of mastil, the remainder of surface covered with very large adjoining punctures. Scutellum secalacicate at base, median area sparsely punctured. Mesopleura sparsely punctate, hind border margined with a single row of very uniform areolae.

Propleuron reticulum-foveate, the narrow median area with strongly raised margins; submedian and lateral dentations very obtuse, hardly evident. Dorsum with the two short ocellus homeral carinæ very strong, the entire remainder of surface of basal two-thirds covered by fine, crowded, longitudinal reticulae.

*See from side, abdomen much shorter than head and thorax, becoming very gradually deeper apically, the ventral cavity broadly extended to apex, where the epipositor projects about one-fourth length of abdomen. Antennae broken beyond fourteenth joint, but thus far stoutly terete. First and second abscisse of radius and second transverse cubitus subequal in length; third abscissa of radius straight. Nervura postfurcal to a little more than one-fourth length of first abscissa of discoidal.

Botany Bay, New South Wales (Petersen).

One specimen of this unique species. One of the most distinct of many new forms discovered by Mr. Petersen.

* A condition not noted elsewhere in this tribe in such extreme development.
Baker: Braconidae-Chalcidinae

Aegyptiella carnea sp. nov.

Length, female, 3 millimeters.

Black; basal third of abdomen stramineous, the hind margin of this colored area transversely straight. Basal half of anten-
ae ferruginous, apically piceous. Legs stramineous; all femora
and hind coxae largely piceous, as well as hind tibiae except at
base and hind tarsi. Wings piceo-rufous, more deeply so
beneath the stigma, vein medially as dark as stigma; proximal
point of stigma bright stramineous and from this a narrow
white band extends across the wing to outside the second ab-
scissa of dorsocentralis. Tip of stramineous.

Clavus smooth and shining, with few widely separated punctures; anterior margin narrowly emarginate. Face much broader
than long, thickly coarse-punctate with no indications of rugae
at extreme base a thin sheaf median carina which extends be-
tween antennae and from this to eysinus a broad, low, irregular
ridge. Sutures very short and broad, near to sockets very
close and nearly smooth, above rugae-punctate like the ver-
tex; with several irregular, fine, longitudinal rugae between
clypeus and orbits. Vertex not concave, ocellular distance
slightly greater than width of ocellar area. Genae broader
throughout in side view than eye, very coarsely, somewhat
irregularly punctured, malar area long, nearly equaling width of
eye. Maxillaeum with median basal area minutely, irregularly
foveolate; the notauli are deeply suddenly impressed through-
out, and connected basally by an arcuate impression; remain-
ing surface densely, coarsely punctate. Scutellum acravate
basally, the disk concave but smoothly, longitudinally rugo-
punctate. Propodeum irregularly fine areolate, the median
area of usual form, narrow, but with a strong complete median
carina, and with several complete, oblique, stronger rugae on
lateral area; submedian and lateral teeth not evident; posterior
concave face very strongly sculptured. Mesepimeron coarsely,
irregularly punctated, somewhat rugose on below. Dorsum
with humeral carinae strong, straight and very close together;
distance between them being only one-third of basal width of
dorsum; entire surface to near apex very finely longitudinally
reticulate-rugose; extreme apex smooth and shining. Abdomen
shorter than head and thorax together; view from side very
gradually deeper to the rather narrowly rounded apex, ventral
convexity widely extended to the very apex; ovipositor entirely
retracted in this specimen. Maxillary palpi with both second
and third joints strongly swollen. Antenna broken beyond twelfth joint, stoutly terete but evidently somewhat elongated on apical third. Second antena of radius slightly longer than first and distinctly longer than second transverse cubital; third antena of radius distinctly arculate. Nervous postnotum to one-third of first section of discoidal.

Ebor (about 1,500 meters altitude), New South Wales (Peterson).

Resembling A. berwicki in some respects, but distinct in size, coloration of wings, and other details. Possibly this species may be closer to A. norvegicus than to any other. The form of the scutum in this species tends toward that of the Malay species.

Accagister detritus sp. nov.

Length: male 2.5 millimeters.
Black; head pale ferruginous with exception of eyes and occular area, the mandibles anternocorous; scape pale ferruginous, antennae shading into very dark ferruginous apically; legs entirely straw yellow, the hind tibiae and tarsi slightly darkened apically. Antennae with about basal half straw yellow, the terminal boundary of this area in the type rather irregular. Wings hyaline, veins all much paler than the dark brown stigma. Top of scutum stramineous.

Clypeus shallowly, coarsely, and rather sparsely punctured, distinctly transverse and with anterior margins narrowly arcuate. Pate much wider than long, the surface longitudinally impressed submedially, rather shallowly, finely rugo-crenate, the trend of rugosity being downward and medially. Scutum deep, but very short and broad, separated below by a delicate median cuneus, the inner surface like the entire vertex very finely, transversely rugulose with costiferous punctures. Lateral occuli very large, about twice size of anterior, the three subequal in size; occular distance about equaling width of occular area. Sides of head long behind eyes, but rapidly incurved to occiput; in direct dorsal view the face is roundly somewhat protuberant before eyes. Metascutum very crenate, irregularly punctate on median basal area, less strongly and more sparsely punctate elsewhere, the linea of notaulis somewhat impressed. Statellum basally scrobiculate, the disk shining and very sparsely minutely punctured. Propodeum with very large, irregular, shallow areoles which are coarsely, confusedly punctured within; median area not separated; submedian and lateral teeth
Baker: Brunoeidae-Chelonidae

lacking. Disk of mesopleura coarsely, confusedly punctured above, sparsely punctate and shining below. Dorsum with humeral carina strongly oblique; surface finely, thickly, longitudinally reticulate-ripened; entire apex smooth and shining. Viewed from side, abdomen is distinctly shorter than head and thorax together, gradually deepening posteriorly to the rounded apex; ventral concavity broadly extended to very apex. Antennae broken beyond eighteenth joint, but teretes throughout. First abscissa of radius slightly longer than second, but nearly as long as second transverse abdominal, the third abscissa slightly incurved. Meracaps postfurcal to about one-fourth of first abscissa of discoidal.

Botany Bay, New South Wales (Peterson).

Very close to A. tricolor Siegelgärtl, described from Mount Vic-
toria, New South Wales, but much smaller, with the opaque vertex thickly, transversely rugulate and little punctate, the legs entirely pale yellowish, etc. Siegelgärtl's description is too brief to make a detailed comparison possible. He speaks of the clypeus of tricolor as "rnudlich" but it is undoubtedly transverse as in all other species.

Anaspaster rhodes sp. nov.

Length, male, 5 millimeters.

Black; head violeat ferrugineous; mandibles darker at tips; cunei concordous with head, but flagellum piceous. Fore and middle legs pale ferrugineous; hind legs largely piceous except trochanters and bases of tibiae. Wing somewhat infumated, strongly so beneath the dark stigma; veins paler than stigma; femur between stigma and prostigma a narrow pale band extends across the wing as in A. elioti, but not white as in that species nor involving stigma. Temporal ferrugineous.

Clypeus sparsely coarse punctate, the anterior margin narrowly subtruncate at middle; basal sutures very strongly arnate. Face thickly, coarsely punctured, with a few indistinct rugae next orbits; surface basally with two broad shallow submedian longitudinal impressions, which leave between them at base a very short, blunt, median ridge. Sterna throughout with thick, concentrically transverse rugulae and very sparse punctures, and no bounding rim except at sockets. Vertex transversely rugulate, with sparse punctures; the occipital distance a little greater than over-all ocellar width; the ocelli subequal in size, the distance between posterior much greater than to anterior; face slightly broadly protruberant before eyes. Entirely depressed
basal area of mesonotum with small irregular but distinct areoles, which are narrowly extended along lines of areolesl; remainder of surface thickly coarsely punctured. Scutellum septemvrate at base, the disk smooth and shining and with few minute punctures.

Propodeum with a semicircular rimmed median area on posterior half of upper surface, the broad half represented only by a strong median carina; lateral to this occur several strong oblique rugae; the surface otherwise with small irregular areoles; posterior rim without teeth; terminal concave face strongly sculptured. Disk of mesopleura in large part with small irregular areoles, lower posterior port smooth and shining. Dorsum with the rather long and strong humeral carinae parallel on disk of basal third; remainder of surface thickly, sharply, longitudinally, resinadally rugose, with sharply defined, small angular areoles on the apical third; on extreme apes these become thror, oblique, irregular rugose. Viewed from side the abdomen is distinctly shorter than head and thorax together, rather rapidly deepening to the broadly rounded apex; ventral concavity broadly extended to very apex. Antennae with scapes rather short and thick, flagellum broken beyond twenty-third joint, all joints terete elongate; even in this broken condition nearly as long as body. First abscissa of radius much longer than second, or than second transverse cubital; third abscissa of radius rather strongly incurved. Basal vein, second abscissa of cubitus (especially distal), and first abscissa of radius strongly broadened. Neurocranium punctiform to about one-fourth of first abscissa of discoidal.

Illawarra, New South Wales (Petersen).

Sulpigellis described only one red-headed Ameipes (A. tricolor) from Australia. It now appears certain that there is a group of species in Australia closely related to A. tricolor. The matter is greatly complicated, not only by the incomplete description of A. tricolor, but also by the great difficulty of distinguishing and properly associating the sexes, with the scant and imperfect material now at hand. The genitalia in all of these species are closely retracted and, though the ventral concavity in all extends in full width to the apex, still examination is very difficult without dissection. Also, most of the other genera do not show the very striking sexual differences so apparent in the antenne of many Catobus and described by Marshall long ago. There is here, therefore, the greatest
need for collecting large series, as has been done with many Malayas species in other groups. So far, all species of this group have come to us in very few specimens.

A single specimen with broken antennae, also from Ilawa, may be the female of this species. While the general appearance of the insect is very similar, the differences in detail are sufficient to make this reference a tentative one until more material shall have been obtained. It differs from the male as follows:

Length, female, 2.55 millimeters. Head less brightly ferruginous. Wing less strongly infumated and the hyaline cross-band less conspicuous. Hind legs pale yellowish like the others. Abdomen with basal third suffused, very dark ferruginous, this coloration very inconspicuous. Tegulae pale stramineous.

Clypeus with broad median portion of basal sutures straight, not at all arcuate; disk smooth and shining with very few minute punctures. The basal arculate area of mesonotum narrower. Scutellum with large and somewhat more numerous punctures. First abscissa of radius subequal to second abscissa and to second transverse cubitus.

Asopaster distinctus sp. nov.

Length, female, 3 millimeters.

Differ from A. viridis as follows: The ferruginous of head less vivid. Inner surface of scopen darkened. Legs all very pale ferruginous except tips of hind tibia and hind tarsi which are pigrous. Wing less strongly infumated and with transverse hyaline band less conspicuous; tegulae stramineous. Abdomen with basal third clear stramineous.

Clypeus nearly smooth, with very few punctures. Face without appreciable regular near orbita. On depressed basal area of mesonotum a sharp, strong, median carina, the spine on either side of this showing a distinct tendency to longitudinal arrangement. Scutellum with only four very large fovea at base, the disk covered with large punctures separated by at least their own diameter. Ovipositor very shortly exerted in this specimen. Antennae broken beyond the twenty-sixth joint. Basal vein not evenly arcuate, suddenly bent near base then straight to prestigma.

Ilawa, New South Wales (Petersen).

Very close to A. viridis, but distinguished by differences in clypeus, mesonotum, and scutellum. While material at hand does not furnish any basis for estimating the range of variation.
in this group, still it seems that this form cannot be associated with the female above tentatively referred to A. vivida.

**Anopgaster maricings sp. nov.**

Length, male, 3.5 millimeters.

Black; head and legs nearly of same shade of pale ferruginous; nearly entire vertex, to very near orbits, black; hind thorax nearly white on head half. Wings slightly infumated on distal half, with a very faint indication of the transverse hyaline band of other members of this group. Venal somewhat paler than the dark stigma, the median much paler. Tegulae stramineous.

Differing from A. vivida in structure as follows: Clypeus nearly as thickly coarse punctate as the face. Face very short, the blunt median ridge extending to clypeus. The sharp, strong, transverse rugulae of vertex intermingled with large punctures, these deeper behind ocelli. Notauli distinctly formate nearly to anterior border of mesonotum. Scutellum quinquefasciate at base, the disk covered by large punctures which are mostly not separated by as much as their diameter. Propodeum with the median area larger and somewhat longer, and the basal median carina therefore shorter, the lateral arそloeden much stronger, with rims of areoles sharply raised, and without lateral oblique rugae. Mesopleuron with very large punctures, these larger and coarseness above; a deep, curved, longitudinal, somewhat opaque impression extends from middle of fore margin caudad and downward to hind margin, this broad groove being occupied throughout by vertical furrows. Dorsum with the small, sharply defined, apical areoles occupying nearly all of apical two-thirds. Metanoea 27-jointed and a little longer than the entire body. First aebrites of radius equal to second and these each slightly longer than second transverse cubital, and with first transverse cubital and second abdominal of cubital exceed to greater diameter than other veins. Nervulus a little longer postfurcal.

Botany Bay, New South Wales (Petersen).

This is the most distinct species among the red-headed forms, widely separated, later alata, by the broad distal groove of mesopleuron.

**Genus GAYCOOMASTER n. gen.**

This group, as characterized in the above generic synopsis, presents a greater departure from normal Anopgaster than has yet been indicated by any author for this assemblage. The
position of the median ocellus is distinctive. The head is more swollen and more approaching subcylindrical than in Aesopoditer.
The character of the sculpture is likewise unique.

In 1915, Fullaway described a species from Java (Diposopos) which he placed in Aesopoter, and which evidently pertains to Cancoperiter. It exhibits the characteristic position of ocelli, and the first densest coil is described as "punctate," which evidently refers to the very distinctive origin of the cubital on the basal vein considerably below the stigma. Fullaway does not, however, mention any special formation of posthumeran denticiles in any part of the margins of scutere—a very conspicuous development in each of the three species now at hand.

**Type C. fullawayi sp. nov.**

**Synopsis of species of Cancoperiter g. nov.**

**C.**

<table>
<thead>
<tr>
<th>Species Description</th>
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<tr>
<td><strong>C. fullawayi sp. nov.</strong></td>
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<tr>
<td>Length, male, 4 millimeters.</td>
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<tr>
<td>Black; antennae and femora and middle legs very dark furunculose, the tarsal paler; hind legs with coxae black, femora and tibiae paler. Wings pinnately infuscated, much more darker so in apical half of first subcubital cell, and all of second cubital and radial cells, this subcubital bordered basally by a transverse line passing from stigma obliquely through middle of first cubital</td>
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cell. Palpi pale yellowish; mandibles black, with dark ferruginous tips, tegulae very dark ferruginous.

Clivus strongly and subquadrilaterally arcuate basally and apically, the surface smooth and shining and sparsely, minutely punctured. Face with length about three-fourths of width, surface completely covered by large, deep, sharp-rimmed areoles; at center of median line a very short, high laminate carina; from the high, raised, outer angles of antennal sockets several strong rugae extend downward and toward center of face; centrally and above these rugae, the areoles are smaller. Between the antennae a very high and very thin laminate median carina. Inner orbits parallel. Surface smooth and shining within, but with coarse, widely separated, transverse wrinklings; areoles outwardly margined by high, thin, complete carina which near the middle are raised into sharply angulate teeth; outside these rims are several very large and very deep areoles with smaller ones next orbits. Vertex entirely coarsely areolate. Eye of usual form but small, the maker space nearly as long. Genae of great and subequal width throughout, nearly twice width of eye, the surface obliquely areolate, the blunt, low rims thick and bearing scattering, minute punctures. From above, the thick head has the very strongly white piceous face nearly at all prominent, but comparatively marked by the lateral areola teeth, the high, sharp-rimmed, and very prominent antennal sockets, and the central facial lamina which is clearly visible in dorsal view. Mesonotum entirely covered by large, subequal, deep, sharp-rimmed areoles of irregular arrangement; the position of notauli obscurely marked by broad, shallow, oblique impressions. Scutellum trivittata basally, the disk with a high, sharp, median ruga and two lateral rugae on either side, between these ill-defined areoles. Pore field and propodium sculptured like the mesonotum, but even more coarsely so, the transverse posterior suture of later with submarginal and lateral teeth very large, obtuse-angular, and strongly protuberant, the upper arm of propodium medially very short. Dorsum with the short humeral carinae very strong and oblique; entire surface deeply sculptured with small longitudinal areoles, those having within them many smaller, rounded areoles, hind ones distinctly transversely rugose-punctate. Abdomen scale spinulose, its extreme apex with a short acute terminal extension; viewed from side the depth is but little greater subquadrilaterally than basally, the ventral convexity extending but two-thirds of ventral length. Antennae 41-jointed, a little longer
than entire body, scape rather slender, reaching behind ostiell; flagellum somewhat thickened at middle third, the tips strongly attenuate, the basal joints elongate and tenuis, from tenth to near end very short and as broad as long or but little longer. Wing with both first abscissas of cubitus and first abscissa of discoidal strongly bieminent. First abscissa of radius slightly longer than second which equals second transverse cubital; the third abscissa of radius straight. Nervules postfurcal to one-fourth length of first abscissa of discoidal, the intervening portion of discoidal markedly thickened.

Lugonio, Benguet Subprovince, Northern Luzon (Raber). Another specimen from a n-distant mountain locality, Isneg, Nueva Vizcaya Province (Raber).

*Casmerodius* fallax var. *mapiquagras* nov. nov.

A specimen that does not appear to represent more than a varietal form of this species was taken on Mount Mapiquag, in central Luzon, which locality is separated from the mountain localities of the typical form by the broad interior plains of central Luzon. This variety differs from the typical form as follows:

Clypeus with sparse but large punctures. Face with the high interantennal lamina, and the median facial prominence, connected by a distinct median carina which also extends to clypeus. Scutellum quinquenervatus at base, the disk with about six irregular subequal longitudinal rugae.

*Casmerodius* mapiquagras sp. nov.

Very similar in general habitus to *C. fallax* var., but differing as follows:

Length, male, 4.25 millimeters. Antenna with scape and basal half of flagellum pale ferrugineous. Fore and middle tibie with piceous shading.

Clypeus of similar form but with spinous margin broadly arcuate, its surface thinly, coarsely punctate. Face with a strong, even, prominent median carina which lacks any raised laminate prominence at middle. The interantennal lamina is here developed into a stout, acutely triangular tooth (frontal view) which is medially carinate to its apex. Face nearly as long as broad, the surface armed smaller and therefore much more numerous. The sharp, high lateral rims of scrobes obtuse, angularly raised at middle, but not forming erect, acute teeth.
Male scape not as long as the eye. Genae very broad below, but distinctly narrowing above. Notauli more narrowly and strongly depressed, median rugae forming a very strong, complete median carina which is highest and strongest at base and bordered on either side by regular rows of areoles. Scutellum with three very large foveae at base, the middle one very large and deep and with its sharp lateral rims continued caudal across entire length of disk, the surface otherwise irregularly shallowly rugose. Antennae broken beyond twenty-eighth joint. First articles of radius a little shorter than second, subequal to second transverse cubital; third articles of radius very slightly incurved.

Sikagaru (Baker).

This species is apparently closely related to the "Acognus" rupatus of Foulkes. The original description of that species is largely devoted to form of scutellum and similar characters, most of which are common to the whole genus, or tribe, or subfamily, while specific details of sculpture and conformation are not mentioned. It is therefore impossible to make any satisfactory comparison. However, the length given for rupatus, 3 millimeters, would separate it from either fowkesi or malayanus. The nervulus of rupatus is also described as "almost interstitial," while in the other species known it is strongly postfarcial. Full away makes no mention of the various modifications of antennal sockets and scutellar rims which occur in these species, and which will also doubtless be found in some form in rupatus. Whether these conspicuous modifications are actual or not is uncertain, but there is no such development in any true Acognus of Malay or Australia, as far as known.

Acognus otrinodes sp. nov.

Length, male, 3.5 millimeters.

Black, with the abdomen throughout a very dark ferrugineous. Antennae pale ferrugineous, darker on apical third. Eyes and middle legs nerved ferrugineous, hind legs picaceous. Wings colored as to the other species, but more strongly infuscated. Tegula ferrugineous. Mandibles ferrugineous, darker at tips.

Differing from C. fowkesi in structure as follows: Face with a high, sharp, even median carina on upper half, which reaches to apex of interantennal distance. Lateral scutellar rims at mid-dle projected vertically in very large, broad, subhemispherical teeth, which project beyond the depressed areoles and which are conspicuously visible in both dorsal and ventral views. Areole
of vertex and thorax of great size and depth. Notauli indicated only at sides of metanotaon by narrow impressions, scutellum trapeziform at base, the disk irregularly small anterior. Propodeum deeply depressed between the very large submedian teeth, teeth with the short humeral carinae very wide apart, nearly parallel, between them with very large, high-ribbed, longitudinal areoles; remainder of surface with smaller areoles of the same type but with the thin rims bulging around frequent large punctures borne on their edges. While the abdomen above is strikingly different in outline, as indicated in the above synopsis, the lateral view is not dissimilar to that of Pogonopus; though the very acute apex appears as a more extended tubular projection. First and second areola of radius subequal and a little longer than second transverse cubital; third areola of radius straight. Nerviella posterior to one-fifth of first areola of discoidal. Antennal scapes small, scarcely reaching occipitum, and rather narrow, their surfaces lustrous, and coarsely, sparsely, shallowly punctured.

Singapore (Color). This remarkable species has quite the form of a minute female Cephalotes. It will be of the greatest interest to secure the female.

Genus *NEMASCOGETES* novum

With the cyclocerine genus Gasterothorax, standing in the Cephalotes, there are a few Malayan species which would be thrown into it by current synopses. Apparently one of these has been described as Gasterothorax nitidus by Enderlein, though this transfer cannot now be substantiated. These species agree with Gasterothorax in some of the vegetal characters used in current synopses, but the fact that the Malayan forms are noncyclocerine and the nerviella is always posterior (usually for) shows that the Malayan forms have no relation to the African Gasterothorax. Certain females in several genera of true Ceratosoma have the abdomen apically bidentate, but this is a sexual character not occurring in all the species, even of the same genus. It seems quite doubtful, however, that the Gasterothorax ovatalis, with apically bidentate carapace, pertains to this group at all. It may belong to Haplocera, where similarly armed females are found. *Nemasscogetes* is unique in form of body, sculpturing, proposed characters, and venation.
The Philippine Journal of Science

Megaseutus elongatus sp. nov.

Length, male, 3.5 millimeters.


Clypeus and face smooth and shining, with sparsely set large punctures. Clypeus large, the basal suture very strongly arcuate, anterior margin obtuse-angulately extended, the apex notched. Face distinctly broader below than above, a little wider than long, with narrow, longitudinal impressions either side of median line, the lateral areas rather strongly lobed, and with a strong median carina on basal half, which is highest between antennae and which separates scrobes. Scrobes with lateral rims high and sharp throughout, and between these and orbits, a single very strong, sharp, longitudinal ruga; inner surface of scrobes smooth and shining. Outline of head from above transverse subrectangular, the gene very strongly developed behind eyes and the width across gene about as great as that across eyes. Occipital area and occili relatively very small; occili sub-quadrate; occicular distance much greater than over-all outline width. Surface of vertex smooth and shining, sparsely coarse punctate, with a few small irregular patches in front of lateral occili. Malar space more than half length of the large eyes. Genal very broad below, narrower above, smooth and shining, sparsely coarse punctate. Mesocoma of the rather short, anteriorly broadly rounded type, basal depressed area with very large, transverse, rather regularly arranged areolae which are deep, sharp-rimmed, and within more or less subdivided; remainder of surface smooth and shining and sparsely coarse punctate; course of midnail indicated by lateral extension of small areolae, the rows of which curve strongly downward to the sides.

Scutellum sericeous basally, the disk smooth and shining and sparsely coarse punctate. Propodeum covered by very large, deep, sharp-rimmed areolae, a median area represented by a longitudinal row of three larger areolae, which extend full length of upper face; hind margin of upper face sharply-rimmed, but nearly truncate, and without either submedian or lateral teeth.
Dorsum with the short humeral canina straightly parallel and as far from each other as from lateral margins, between these three longitudinal costulae, and outside three or four rows; the costula extend two-thirds length of dorsum, between them numerous small, elongate, compound scutellae; beyond this lateral up into a thick-set mate of small areoles, these becoming obsolete on the abaxial costulau spinous extension. The abdomen is longer than head and thorax together, very narrow, sub-parallel-sided, narrowed on the apical fourth to the lamelike apex; viewed from the side of equal depth throughout, the ventral concavity extending to three-fourths the length. Mesopleuron obscurely areolated above, smooth and sparsely punctate below, traversed by a broad and deep longitudinal median groove, which is transversely areolated. Apex of elytra, slender, tectate, the tips slenderly attenuate; sexes very small and short, not surpassing anterior omniscissa, but the omniscissa longer than wide. First omniscissa of radius subequal to second transverse omniscissa, these both distinctly shorter than second omniscissa; third omniscissa straight. First transverse omniscissa strongly upcurved toward the stigma. Neurospirae very shortly postfurcal. Second discidial cell unusually large and long, subrectangular.

Female, length, 6 millimeters; very similar in all respects to male and with same form of abdomen, epygus, acroter, etc. Also, coloration is practically identical. The sides of abdomen are not parallel, but incurved slightly. The slender ovipositer (not valves) is exerted in this specimen in one-fourth length of abdomen.

Baker, northwestern Mindanao (Baker).

Very fortunately, the two specimens taken of this fine species represent the two sexes, and the very close similarity of the two sexes is noteworthy—a condition totally different from that found in Mesorhocalaus, for instance.
NOTES ON ORIENTAL DIPTERA, WITH DESCRIPTIONS OF NEW SPECIES

By J. R. Mallow

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ONE TEXT FIGURE

In this paper are presented descriptions of some new genera and species of Diptera, mostly from the Philippines, and notes on some previously described species which are imperfectly known. The new genera are strikingly distinct from any previously described in their respective families; the outstanding characters are plainly indicated under each. Where several species of a genus are described a synopsis of the species is given to facilitate their identification.

DROSOPHILIDE

Genus DROSOPHILA novum

Generic characters—Arista with short hairs above and below, the longest not much longer than its basal diameter; face not carinate; ocellar bristles represented by a pair of microscopic hairs in transverse line with anterior ocellus; postverticals short; all three orbitalis distinct, the proclinate pair in front of and in line with the anterior rectilinate pair; mouth margin slightly produced, vibrissae very small. Thorax without a humeral bristle, the mesonotum otherwise as in Drosophila, the procoxa of axillaria strong, situated posterior of the posterior pair of dorsocentrals; sternopleurum with two long bristles. Fore tibia without a proapical bristle. Wing as in Drosophila.

Genotype, the following species.

Drosophila nigripes nov. spec.

Female.—Head black, densely whitish gray pruinose; antenna testaceous yellow, third segment largely darkened; palpi black. Thorax black, densely pale gray dusted; apical margin of scutellum testaceous yellow. Abdomen testaceous yellow, terga from third visible one to spiracles each with a pair of round,
deep black spots on disk. Legs testaceous yellow. Wings clear. Halteres pale yellow.

Pronot fully 1.5 times as long as wide, without fine surface hairs; eyes descending to almost extreme lower margin of head, the cheek subsharply. Thorax with about ten series of intra-dorsocentral hairs; scutellum flattened on disk, bare. Legs as in normal species of Drosophil., lower cross vein a little before middle of discal cell; first costal section about one-fifth as long as second, and about 1.5 times as long as third; penultimate section of fourth vein about four-fifths as long as ultimate, the latter deflected apically so that the first posterior cell is gradually widened to apex; outer cross vein at about two-thirds of its own length from apex of fifth vein.

Length, 2 millimeters.

Type, Mount Mauking, Laguna Province, Luzon (Baker).

This genus has much in common with Adeloxorus Przevalsky, but the latter has but one pair of dorso-centrals, and differs in several other respects.

AGROMYZIDAE

Ospholoris parvula sp. nov.

Female.—Head black, densely gray dusted; antennae and palpi orange yellow, third segment of former a little darker around apex. Thorax and abdomen black, densely gray dusted, former not vittate, the abdomen with an opaque deep black spot on each side of each tergite, not visible from above on the basal segment but becoming progressively more obvious apically, and on the apical two or three segments connected with a spot on each side of disk by a series of transverse black streaks. Coxae and femora fuscos, with gray dusting; tibiae and tarsi orange yellow. Wings whitish hyaline, veins pale at bases, dark at apices. Halteres whitish yellow.

Frontal bristles normal, the postverticals a little shorter than the escutella; upper apical angle of third antennal segment quite pronounced. Prefrontal intradorsocentral area with two widely separated series of fine short hairs; basal pair of scutellar bristles shorter than spinal pair. Femora as usual rather stout. Lower cross vein at middle of discal cell.

Length, 3 millimeters.

Type, Mount Mauking, Laguna Province, Luzon (Baker).

This species is distinguished from its allies by the markings of the abdomen, the short basal scutellar bristles, and the color of the antennae and palpi.
Genus TENHIA novum

Generic characters.—Ordinary and postverticals long, the former divergent, the latter convergent; the four verticals long; each orbit with three bristles, all backwardly directed, the upper one curving a little outwardly; face narrow; at middle, central part concave below, and at the upper extremity, the central upper part with some microscopical hairs; a distinct fovea below each antennum which tapers off at vibrissae; chest narrow, with a series of setae along middle to the long vibrissae; propodeum stout; pala normal. Thorax with 1 + 4 long pairs of dorsoventrals, one humeral, one poshumeral, two metapleurals, one supralateral, one pair of precoxal arthrodials, one sterno-pleural, one long and one short postalar, and one propodeal; basal pair of subalar bristles very short. Legs long, tibial and tarsal slender, precoxal tibial bristles minute. Auxiliary vein fused with first at its apex; costa with short but distinct bristles from beyond first vein to apex of second; sixth vein third, abruptly discontinued at about three-fourths of the distance to margin of wing.

Genotype, the following species:

Tenea nigripes sp. nov.

Frons:—Head black; front brown, becoming yellowish anteriorly; entire orbits, including postocular, whitish yellow; check with a black mark posteriorly; face the same color as orbits, the forepart black; antennum and arista black, the former reddish below; palpi brown. Thorax and abdomen black, slightly shining, sparsely gray dusted, dorsum of thorax with traces of three dark vittae, and the humeri, lateral margin of mesonotum, margin of scutellum, upper part of hypopleura, and the vertical mesopleural sutures yellow; the connecting maculae between tergites yellow, but sometimes hidden. Legs black, foretarsus yellowish in front. Wings grayish. Branches of calypteres brown. Halteres yellow.

Eyes bare; third antennal segment not as long as wide; arista subacute; check about one-sixth as high as eye; parapsidal narrow. Dorsum of thorax with sparse hairs, that of scutellum fastened and with very few hairs. Abdomen with six visible tergites. Postcoxal bristles on fore femora present only sparsely; fore tibiae distinctly longer than fore tibiae; hind femur with two apical short bristles, one anteroventral and one
posteroventral. Wing about three times as long as its greatest width; first posterior cell narrowed a little to apex; inner cross vein a little beyond middle of discal cell and distinctly beyond apex of first vein; outer cross vein at less than its own length from apex of fifth vein.

Length, 4.5 millimeters.

Type, Baguia, Benguet Subprovince, Luzon (Isler).

This genus belongs to the Ophiomyiinae and is distinguished from other genera in that subunival that have presutural dorsoventrals by the immaculate wings, presence of postvertexals, possession of three pairs of orbital bristles, the bare mesopleurae, and minute preapical basal bristles.

CHLOROPIDÆ

CHLOROPHILA

Genus CHLOROPHILA de Meijere

Frey records six species of this genus from the Philippine Islands, but I have only two of those on hand at this time.

Chlorophila seversi de Meijere.

One specimen, Mount Maquiling, Laguna Province, Luzon (Isler).

This species is distinguished from its congeners by the lack of an apical dark spot on wing and the entirely blue-black thorax and abdomen.

Chlorophila spicula de Meijere.

Four specimens, Mount Maquiling, Laguna Province, Luzon (Isler).

Distinguished from its congeners by the presence of an apical dark spot on wing, the entirely yellow legs, and the large yellow mark on apex of abdomen which begins near base of third tergite and extends to tip. I have been unable to distinguish any yellow mark on the sternum, such as de Meijere mentions in his description of this species.

MUNICIDÆ

PHAONIIDÆ

Genus HELICA Robinson-Daviesy

This genus is distinguished from Dictyoponera Maitch by the bare prothorax, pteropleurites, and third wing vein, and from Holcota and Xenoponera, both of which are described in this paper, by the last character only.
There are several species before me, which can be distinguished by means of the following diagnostic key.

**Key to the species of Heliina Rubenian-Driesch**

1. **Heliina of male with rather dense soft long hairs on ventral surfaces loosely, tegument and ventral, the ventrolateral surface with fine or few long, strong bristles on apical third or fourth; thorax with four pairs of setae dorsoventralis long; abdomen with dorsal setae very conspicuous; fore tibiae without a ventral posterior bristle; sternopleura 2-2; hind tibiae with a short posterior bristle on apical third of tibiae.**... Heliina heliina sp. nov.
   - Hind femur in nature with long ventral hairs; thorax with three pairs of posterior bristles... 2

2. **Stereoplaena 2-2; scutellum yellow, contrasting sharply with the blackish or black mesosoma, the fore wing with one submedian and two broader submarginal dark veins, the side of scutellum with short hairs below level of the scapula bristles basally; posterior spiracles sometimes faintly pale; fore tibiae without a median posterior bristle; but with a seta near middle on anteroventral surface; leg yellow, tarsi fuscous.**... Heliina heliina sp. nov.
   - Stereoplaena 2-2; scutellum black, colored as melanosome, and near below the level of the scapula bristles... 2

3. Fore tibiae without a posterior median bristle; hind tibiae without a posterior median bristle near base; eye facets of male larger than usual on upper half; posterior pair of prosternal dorsoventral bristles not over one-third as long as the posterior prosternal pair; inner axil of wing very obviously closed... Heliina heliina sp. nov.
   - Fore tibiae with a median posterior bristle; hind tibiae with a short posterior bristle near base; eye facets slightly enlarged above; posterior pair of prosternal dorsoventral bristles nearly as long as the posterior pair... 4

4. Legs in male yellow; base of fore, and sometimes of mid, forelegs darkened; tarsi black; abdomen densely shining, densely gray dusted, with a pair of distal, brownish black hairs; tibiae 2-2; median tibial spur of hind tibiae 2-2... Heliina heliina sp. nov.
   - Legs in male black; tibiae and distal tibial spines of forelegs pale, sometimes tibia yellow; abdomen distinctly shining, evenly and rather thinly brownish dusted, without dark dorsal spots... Heliina heliina sp. nov.
tibia brownish. Wings clear, cross veins not distinctly clouded.

Calyptra and haltere yellowish.

Eyes hairy; frons at narrowest point wider than third antennal

segment; arista plumose. Thorax with 2 + 4 dorsoconicals,

pectinal minute, sternopleurae 2 + 2. Abdomen subcylindrical,

the tergites with rather strong apical bristles; fifth sternite

with only the usual hairs. Fore tibia without a median pos-

terior bristle; mid femur with a few long bristles on basal half

of posteroventral surface; mid tibia with about four posterior

bristles; hind femur with rather dense long hairs on more than

the basal half of ventral surfaces, about six long bristles on

apical half of the anterodorsal, and very long, closely placed,

sebaceous hairs on posterior surface from base to one-third from

apex, where they abruptly cease; hind tibia with one or two

postпродорал bristles near base, three anterodorsal, and four or

five anteroventral bristles. Costal thorn conspicuous.

Length. 4.5 millimeters.

Type, holotype, and six paratypes, Baguio, Benguet Subpro-

vince, Luzon (Baker).

The female has, as usual, the frons fully one-third of the head

width and, except for the lack of long ventral hairs on hind

femur, is similar to the male.

Helina ceronta (Stein).

I have before me two female paratypes of this species sent

ton loan by Dr. C. P. Baker, which agree perfectly with a female

from Mount Maguaing. All three lack hairs on the hypopleura,

while a series of both axes from pupa, which appear to

belong to this or a very closely allied species, have a few thin

hairs both on the upper anterior margin and below the epicnemial.

All the specimens have short black hairs on sides and margin of

ventral surface of sternum basally, the dorsoconicals 2 + 3,

the pectinal bristle very short, arista plumose, and fore tibia

with a short anterodorsal bristle near middle, but no median

posterior bristle.

Helina mindanae sp. nov.

Male.—Head, densely yellowish gray pruinose. Thorax

rather inconspicuously quadrifuritate with black. Abdomen with

a pair of poorly defined, large, brown spots on each tergite

from second to fourth, and faint brown dots at bases of the

bristles. Legs fuscous, extreme spines of femora, and all of
thick, yellowish testaceous. Wings grayish hyaline, inner cross vein slightly clouded. Calypters and halteres yellowish.

Eyes with very short sparse hairs; fame not over the width of third antennal segment; aristae plumose. Thorax with 2 + 2 dorsoventrals, the anterior prosternal pair very short; procoilar basitarsus 3 + 3. Abdomen elongate oval, rather strongly bristled apically, fifth sternite without exceptional bristle. Fore tibia without a median posterior bristle; mid tibia with two short posterior bristles; hind tibia with three or four long preapical anteroventral bristles; hind tibia with one anteroventral and two anterodorsal bristles; no setula on postero-

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M. Mindanao, Surigao Province, Surigao (Baker), type.

Helicia diptera (Staăia).

I assign to this species a number of specimens that have the same general color as the preceding species, but the legs are honey yellow with black tarsi, and there is rarely a slight darkening of the bases of fore and mid femora, the abdo-

mata in male is densely brownish gray dusted, with paired dark spots on tergites 2 and 3, and dark dots at bases of some of the larger bristles. The wings are distinctly yellow at bases, the costal spine is long, and the penultimate section of fourth vein is about two-thirds as long as ultimate section. All the dorsoventrals (2 + 3) are long, and the presutural acrostichal hairs are in two series.

Length, 6 to 9 millimeters.

Locality, Baguio, Benguet Subprovince, Luzon (Baker).

Helicia nigrophthalmalis sp. nov.

Differes from the preceding species only in being more uniform-

ly black, the abdomen being a dark color without dark dorsal spots, at least in the male. Both species have at least one posterior median bristle on the fore tibia and one postero-
dorsal bristle near base on hind tibia.

Length, 6 to 9 millimeters.

Type, male, allotype, and nineteen paratypes, Baguio, Ben-
guet Subprovince, Luzon (Baker).

It is possible that this is only a variety of the preceding species.
This genus is distinguished from Helina by the presence of some setose hairs on the under surface of third vein at base.

**Genus HELINELLA**

I have before me two species of the genus which can be distinguished as follows:

1. Body of tarsi broadly yellow; abdomen in male on yellow at base, the dorsal dark spots small, rather widely separated in middle of tergite.

2. Tarsi entirely black or fuscous; abdomen in male broadly transversed yellow at base, the black dorsal spots very large and separated by a more line on middle of tergite.

**Helina propinqua** (Stiem).**

** Helina propinqua** (Stiem).

**Male.**—Black, slightly shining, densely brownish grey dusted.

**Female.**—Black, slightly shining, densely brownish grey dusted.

Frons, cheeks, and orbit white dusted, interfrontalia black when seen from behind; antennae and palpi black. Thoracic dorsum quadrivittate with black. Abdomen with central part of first tergite and two variable-sized and poorly delimited subtergina.

Marked on second, and another on third tergite, dark brown or fuscous, fourth tergite less evidently marked. Legs dimly tarsaceous yellow, ocelli and femora fuscous, apices of tarsi darkened. Wings brownish hyaline. Calypters and halters yellowish.

Pronotum a little wider than third antennal segment, setulae setose on their entire length, not obliterated the interfrontalia; arista plumose; parafacial in profile almost obsolete; cheeks about 1.5 times as high as width of third antennal segment; palpi not much widened in male, distinctly widened in female. Thorax with 2-3 dorsocentrals, and sometimes a very short seta in front behind nature; anterior pair of prenotal dorsocentrals rather short; anterior intralarval absent or minute; pellure hardly distinguishable; notopleurum bare on sides. Abdomen ovate, dorsal sternite bare, tergal bristles strong apically. Front tibia without a median posterior bristle; mid tibia with two posterior bristles; hind femur with three to five precoxal anterolateral bristles, and some setose hairs on basal half of postcoxal surface; hind tibia with one anterodorsal and one anterolateral bristle. Fourth wing vein almost straight; last section of fourth vein about twice as long as the preceding section.
Length, 6 to 8 millimeters.

Localities, Caninos Mountains, Occidental Negros; Mount Maquilin and Los Baños, Laguna Province, Lamon (Baker).

Some of the specimens are much smaller than others, but do not differ in other respects.

Bethylia stasi sp. nov.

Male and female—This species is structurally similar to the foregoing, but can be readily distinguished from it by the characters given in the specific diagnosis. The female has the abdomen black at base but, like the male, it has the tarsi black; the abdominal dorsal spots very large, and the sublateral thoracic vitta broader and with a brownish buffing along its sides.

Length, 8 millimeters.

Type, male, allotype, and two male paratypes, Laguna Province, Los Baños; female paratype, Mount Maquilin, Lamon (Baker).

I have before me a female from Sumatra that has the femora yellow, and which in some other respects does not agree exactly with the females of stasi, but the material is insufficient to permit of a definite decision as to its specific identity.

The above species is dedicated to Fanstino Q. Odane, a very promising Philippine entomologist, in memory of my association with him in the United States.

Genus EUNICEPS sp. nov.

This genus differs from Myopus in having the fourth wing vein almost imperceptibly curved forward apically, the interfrontalis of the female without a pair of cruciate bristles, and the anterior intemal bristle absent or minute. In both the species known to me the males have the anteroventral surface of the femur armed apically with a series of short, stout, closely placed, black bristles, least developed on the fore pair.

Genotype, Euniceps sp. nov. sp. nov.

There are two species of the genus known to me, the distinguishing characters of which are as follows:

Scientific names, apex of second and base of third segments yellowish, femora in both sexes honey yellow................................. E. spiculifer sp. nov.

Scientific names with the third segment entirely pale honey yellow, femora with a greater or lesser proportion of basal section black, sometimes to well beyond middle................................. E. melanura Walker.
Euryuchus kinahanensis sp. nov.

Male and female.—Head black, with white dusting; extreme apex of second, and base of third antennal segment yellowish; palpi black. Thorax black, rather densely gray dusted; humeri and pronotal prosternum yellow, the latter darkened at base, dorsum of thorax distinctly vitaceous; when seen from behind there are two broad vitreous along the lines of dorsocentrals, and two laterad of those which are broken at extreme, but when the dorsum is viewed from in front the dark and light vitreous are transposed. Abdomen brownish, yellowish transverse at base, each tergite except the first with a pair of large black discal spots, least conspicuous on fourth. Legs yellow, coxae and femora blackish. Wings yellowish, most noticeably so at bases. Ca-lyptres and haltere yellowish.

Eyes bare: Frons in male as wide as third antennal segment, orbita setose on their entire length; frons of female about one-sixth of the head width at vertex, gradually widened to anterior margin, the two upper bristles on each ocellus directed backward, the median bristles short, anterior one very long; antenne plumose; palpi hardly dilated in male, rather distinctly dilated in female. Thorax with 2–4 dorsocentral bristles, the anterior pair of postnotum a small but distinct; scutellum rather elongate, bases on sides; sternopleurals 1–2. Abdomen elongate ovate; basal sternites bare. Fore femur with one or two short presternal anterocentral bristles, the mild and blind pairs in same set with a series of cloudy placed, short, stout bristles on spine or spine on spinal third or more of the same surface; femora of female without these short bristles, the hind pair with two or three longer, presternal, anterocentral bristles; fore tibia without a median posterior bristle; and tibia with two posterior bristles; hind tibia with one anterodorsal and one anteroventral bristle. Fourth wing vein hardly curved forward apically.

Length, 7.5 to 9 millimeters.

Type, allotype female, and four female paratypes, Mount Ma-querang, Laguna Province, Luzon (Riker); paratypes, two females, Fort de Kock, Sumatra, 1505 (Jacobs); males, Tandu, Janggadang, Sumatra (Jacobs); Perambuk, Ceylon (E. E. Greene); Singapore (Riker); Siam, Singale (H. C. Robinson) and N. Alexander); Pahang, Federated Malay States, De-ember 5, 1921 (E. M. Pecktor).
Katypsa truncata Walker.

Very similar to the foregoing species, differing essentially as stated in the above synonym. Usually the anterior pair of post-sutural dorsocentrals is even less developed than in the last species.

Localities: Mount Maquiling and Mount Basilan, Luzon; Buri-geo, Siquirres Province, Mindanao (Skinner).

Bornera signithorax Stein.

This species and the next have the characters of Bornera, except that there are one or two weak notals at the base of third wing vein as in Myaena, and the preceding genus. The rather protruded front at bases of the antennae, with the lack of spinae when the head is seen from the side, coupled with the long plumose arista, and the thoracic chaetotaxy, are sufficient to justify their retention in Bornera.

The general color of signithorax is fuscous, with the base of arista, almost entire abdomen, and the tibia tawny yellow. The calypters and halteres are brown, and the wings evenly smoky.

The eye facets in males become gradually larger on the upper portion of eyes. Thorax with 2-4 dorsocentrals. Fore tibia without a median posterior bristle; mid tibia with two posterior bristles; hind femur with four or five preapical anteroverentral bristles; the posteroventral surface has hind tibia with one anteventral and one anteroverentral bristle.

The female has the front at vertex about one-fourth of the head width, widened anteriorly, and each orbit with three anterior recurved bristles, and two upper bristles outwardly curved. The hami are yellowish, and the abdomen fuscous except at base.

Length, 2.5 millimeters.

Many specimens from Los Baños and Mount Maquiling, Laguna Province, Luzon (Skinner).

Bornera homberi sp. nov.

Male.—Black, shines. Arista yellowish basally, face and cheeks with whitish dusting. Thorax with brownish dusting, but not noticeably vitellate. Abdomen when seen from the rear with brownish dusting and two pairs of elongate, black, submedian spots, one on second and the other on third tergite. Legs
**Genus *Pityia* novum**

**Generic characters.**—Frons in male about one-sixth of the head width, vertical and postvertical bristles of equal length, not half as long as the forwardly directed occipital pair; orbits narrow, each with some inwardly directed bristles which become longer anteriorly; face slightly foveolate below base of each antenna, the upper central part therefore with a rather sharp carina; antennae elongate; arista plumose; facial ridges with a series of microscopic hairs below; proboscis rather stout. Thorax as in *Helena*, but the prosternum hinged on sides. Abdomen with rather strong bristles on apices of tergites. Legs and wings as in *Helena*, but the fourth veins with a very slight bend forward near apex.

**Genotype, *Pityia zanthocephala* Walker.**

**Pityia zanthocephala** Walker.

Head black, with white dusting, third antennal segment bright yellow. Thorax black, with conspicuous white-dusted markings, the dorsocones on the dorsum bear two black spots in front of scutum on the lines of dorsocones, a broad transverse band behind scutum, and the scutellum black: pleurae with a broad, median, white, vertical mark. Abdomen black, narrowly yellowish on apices of tergites, second and third tergites each with a white-dusted and wide fascia which is narrowly interrupted with black in middle, fourth tergite with only a narrow black central line, the broad black apical fascia of the other tergites absent. Legs black, tibiae brownish. Wings hyaline, yellowish at bases and along costa. Calypters yellow. Halteres yellow with fuscous knobs.

Dorsoconal bristles 2–3, anterior presternal pair short; only one poststernal intrasegmental present; presternal short; sterno-
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Plurala three: hypopleura with hairs on lower posterior part, and quite noticeable hairs along the lower margin of the spinule; rectum bare on sides and below. Basal abdominal sternite bare; tarsi slender, longer than tibia; mandible with two posterior bristles; hind femur in male with short, fine, subventral bristles and a rather strong, short, posteroventral bristle about one-fourth from apex; hind tibia with a very fine short setula in the position of the calcar of Phaenis and its allies, and two or three short, fine anteroventral bristles.

Length, 8 millimetres.

Locality, Los Baños, Laguna Province, Luzon (Rucker).

I have seen this species also from Dematá.

Genus PLURALA new

Generic characters.—Similar to Polistes, having the proternum and upper margin of hypopleura in front of spinule hairy, and the hind tibia with a bristle well beyond the middle on posterodorsal surface. The eyes are but sparsely hairy, the thorax has only one pair of acrostichal, the preantellar pair, the prean- pleura in bare, and the facial ridges are bare except near lower margin. Third wing vein bare at base, fourth not curved forward at apex. Belongs to the same group as Phaenis and its allies.

Stenopa lekani sp. nov.

Male.—Black, densely grayish dusted. Antenna and palpi orange yellow, the latter infuscated basally. Thorax when seen from behind with four narrow dark brown vittae; scutellum with a large brown mark centrally; humeri yellowish. Dorsum of abdomen deep black on disc of basal three visible tergites, merging into brown laterally, and not extending to sides; fourth tergite had gray, slightly brownish at base, and narrowly yellowish at apex. Legs yellow, fore coxae, bases of hind femora, and the tarsi a little darker. Wings strongly tinged with yellow, veins yellow, darker apically. Calypter yellowish. Halteres brownish.

Eye sparsely haired; from linear above, orbita setose on anterior half; mandible in profile linear; cheek higher than width of third antennal segment; the latter about four times as long as second; arista plumose; palpi rather stout, their bristles short. Dorsocentralia 2 + 4; both postocular intradorsal
long; pedicel long; antennal bare on sides and below; sternopleurals 1 + 2. Abdomen broadly ovate, basal sternite bare; all tergites with long sparse bristles on posterior margins and laterally at middle. Fore tibia without a median posterior bristle; mid femur with a few posteroventral bristles basally; mid tibia with three posterior bristles; hind femur with a series of short, fine, anteroverentral bristles that become longer apically; hind tibiae with two anterolateral and three or four fine anteroverentral bristles. The posteroventral calcar short.

Length, 7.6 millimeters.

Type. Mount Banahaw, Luzon (Sécher).

Athesgenes estesiola sp. nov.

Male.—Head black, orbits, frontal triangle, sides of occiput, and the entire face and cheeks densely gray dusted; interfrontalia dark brown, reddish in front; antennae and palpi black; arista brown. Thorax black, densely gray dusted, dorsum with three rather faint dark vittae; humeri slightly yellowish, obscured by the dusting. Abdomen testaceous yellow, sides of the rudimentary first tergite with a fusaceous mark which extends over anterior part of second also, the second with a pair of large, oblong, fusaceous marks on disk which extend almost the entire length of tergite, fourth with a pair of smaller brown marks, third and fourth tergites each with a pale brown central stripe, the dorsum with gray dusting between and lateral of the dark markings. Legs testaceous yellow, almost the entire fore femora, basal halves of mid and hind femora, apical two-thirds of fore tibia, and fore tarsi except the apical segment, black; hind tibiae apically and hind tarsi basally darkened. Wings hyaline. Calypters and halteres whitish.

Head normal; second segment of arista about three times as long as thick, third tapered, microscopically pubescent; palpi long and rather slender, the basal bristles weak, apical hairs soft and curled. Thorax normal. Second and third abdominal tergites equally long, the third meeting on ventral apicite, fifth tergite with a pair of long slender divergent dorsal bristles which are as long as third tergite, and also with a slight transverse apical ridge in front of which the disk is slightly hollowed out, but there is no prominent chitinized protuberance; below the level of the base of hypopygium there is a
long bristle on each side similar to the one on fifth tergite, but the exact situation of these is impossible to decide except by dissection, a course not permissible with a single type that is distinguished by such outstanding structural characters as this one. Fore femur as in varia Melgas; fore tarsus as long as fore tibia, second segment with some exact hairs below, those at base longest and short as long as the segment; hind femur without preapical anterocentral bristles; hind tibia with a short, stout, sharp pointed apical bristle on posterior side. Inner cross vein a little beyond middle of discal cell; first posterior cell a little narrowed spirally.

Length 3.5 millimeters.

Type. Monte Maquilling, Laguna Province, Luzon (Stocker).

No other species of the genus known to me has two pairs of long, backwardly directed bristles on the apical abdominal segments, and such a slight elevation of the fifth tergite.

*Genus Xenogena* Mallach

I published a key to the species of this genus in 1935. The new species described herein runs to pedios var. *Rufomarginata* Mallach, but is much paler, with the preapical and anterior two pairs of postapical dorsocentrals conspicuously shorter than the precostular pairs, not as long as those in *Rufomar- ginate*, the apical bristles on third and fourth visible abdominal tergites are short and fine, whereas in the old species they are long and strong, and there is no transverse series of discal bristles on the fourth tergite in *xenogena*.

*Xenogena simiensis* sp. nov.

*Female.*—Head testaceus; frons black, with gray dusting; parapetals except at upper extremity, and the cheeks except at anterior margin, fuscous; occiput grayish, with a pale dusting; antennae yellow; palpi brown. Thorax reddish testaceus, with grayish dusting. Dorsum with four brownish vitreous. Abdomen reddish testaceus, shining. Legs concaveis with abdomen. Wings yellowish hyaline. Cephalic and halteres concaveis with abdomen.

Head as in allied species. Only the two precostular pairs of dorsocentrals long and strong, the others (anterior intrascocor, and preapical) short and rather weak; scutellum bare on

side, one seta below near apex in type; hypopleura with a few microscopic hairs on lower posterior angle; some black setiform hairs along lower margin of metapleural spiracle which character is not found in any other species of the genus. Abdomen orange, with some hairs on basal sternite which are normally absent in the genus, and no strong tergal bristles. Legs except hind pair missing in type; hind femur with three or four proapical anteroventral bristles and one or two fine hairs near base on posteroventral surface; hind tibia with one anteroapical and about four anteroventral bristles. Wing normal.

Length, 7.5 millimeters.

Type, Herpet. Siam (Robinson and Amecola). [British Museum.]

MUSCUNUM

Genus BRYANTINA novum

Genus characters.—Appears to be most closely related to Gymnopus Robinson-Davylis. Head higher than long, frons fully covered third of head width in male, fully twice as wide as long at center, a little longer on sides, the orbits slightly differentiated, each with two bristles, the anterior one incised, situated near front margin; ocellar, postvertical, and vertical bristles long, the postvertexa widely divergent; face deeply excavated, with a slight central vertical ridge; antennae elongate, third segment covered with conical spines pale down, and about eight times as long as second segment; second segment of arieta much elongate, third widened in middle, long-haired on upper side from near base to apex, on underside only on apical fifth. Thorax with 2 + 1 disseccal, one postcentral lateral, one pair of preapical and postapical, and one strong proapical; proepimer, proepilera in center, preepilera, hypopleura, and postcentral setae all on middle, the others all bare. Abdomen robust. Legs slender. Lower calypter broad, subimbricate at apex. Genotype, the following species.

Roperxum jenwai sp. nov.

Male.—Head testaceus, upper occiput, frons, and face cinnamon brown, the orbital angles blackish; antennae brown, third segment black, arieta brown basally, black apically, the
hairs black; palpi and protopodites brownish, the latter dark at apex. Thorax tuberculate, dorsum, including scutellum and postnotum, broadly black on disk, the mesonotum with lateral margins and two broad vittas along lines of dorsocentrals white dusted, the white dust carried across in front of scutellum and connecting the submedian vitta; a brown spot on middle of hind margin of mesopleurae and another on sterna. Abdomen tuberculate, with large transverse black marks on spiral four visible tergites. Legs tuberculate, tarsi black. Wings hyaline, costal vein yellow at base, dark beyond humeral cross veins, a dark patch near apex of submarginal cell and another near apex of first posterior cell due to the presence of dots, dark, microscopic hairs. Calyptrte yellow, a blackish spot on upper one near base. Halteres yellow.

Eyes sparsely hairy; second segment of antenna fully six times as long as thick; cheek higher than width of third antennal segment; palpi tapered apically; proboscis slender, labella normal. Sternum with one fine bristle. Five visible tergites occupying about one half the area of dorsum of abdomen, slightly concave in posterior outline, the next three tergites widest at middle, tapered laterally; basal two sternites with a conspicuous group of short black setaeless hairs on each side of hind margin, the succeeding sternites less noticeably setiferous, fifth with a shallow, broad, apical, rounded emargination; hypopygium small. First femur with a complete series of posterior ventral bristles; tibia with a short posterior bristle; mid tibia with a short posterior bristle; hind tibia without evident ventral bristles; hind tibia with one archephalial and archepisternal, both very short. Costal vein thickened beyond humeral break, tapered to auxiliary veins; third vein slightly acute apically.

Length, 5 millimeters.

Type, Triobola, Mount Orde, Java, 4,500 feet, 1909 (Brundt and Polner).

Named in honor of the first-named collector. Type in United States National Museum.

The genus is one of the most remarkable of the genera in the subfamily; the strikingly distinct structure of the head and the absence of hairs on the base of arista are sufficient to distinguish it from any other of the male sex, which is the only one known to me at this time.
TACHINIDAE

Genus CYLINDROVIELLA new

Generic characters.—This genus differs from Cylindromys
Melan in having the palpi large and rather broad, and the
first posterior cell of wing widely open, the venation being similar
to that of many Phaeninae with the fourth vein very little for-
wardly inclined apically, not more than the third vein de-
flected apically. Despite the phaenine venation, this is a true
tachinid with much the same appearance as a Cylindromys.
Like that genus, it has the vertical part of thorax below base
of abdomen and above hind coxa heavily distilled and slightly
curved, its extent being about equal to that of metanotum below
postscutellum. Vertex with a pair of strong inner bristles, the
others minute or absent; occiput small, divergent; forewings
mainly about one-fourth of the head width, orbits narrower than
interoculars, with only incurved inner marginal bristles; pa-
thalbs almost indistinguishable from the side; antennae elong-
ate; aristae bare; prothorax short. Prosternum, and propleura
central, bare; mesopleura with two or three bristles on upper
third of hind margin; anterior sternopleural absent, the other
two present; hypopleural bristles long. Abdomen subcylin-
drical, with bristles on sides of tergites, central apical bristles
present only on first visible tergite. Inner cross vein a little
before apex of next vein and slightly beyond middle of distal
cell; outer cross vein at least as in own length from apex of
fifth.

Genotype, the following species.

Cylindroviella bokeri sp. nov.

Note.—Head blackish brown, densely gray dusted, antennae
dark brown, apex of second and base of third segment reddish;
palpi dark brown. Thorax glossy black on disk, the sides of
mesonotum, and the pleura gray dusted. Abdomen glossy honey
yellow, becoming blackish apically. Legs shining brown.
Wings purplish hyaline. Calypters white. Haltere yellow.

Eyes facets enlarged slightly in front; cheek not as wide as the
radius wide third antennal segment; palpi nearly bare. Dorsal
centrals weak and short; prenotal acrostichals weak, two-
rowed; scutellum smooth, with four bristles and many hairs.
Tergites becoming shorter apically, the bristles on sides stout
and of moderate length on first and second tergites, those on
sides of third, and some of those on second short and rather
stubby, one long bristle at base on each side of third. Hypopygium with a pair of short, sharp, slightly curved cerci, Femaora rather stout, each with some sparsely, moderately long bristles on basal half, and a series of short spines on apical half of anteroventral and posteroventral surfaces; fore and mid tibiae without evident spines at middle, hind tibiae with one anteroventral, one posteroaxial, and two anteroaxial bristles, all short. 
Length, 3.35 millimeters.
Type, Surigao, Surigao Province, Mindanao (Rucker).

Genus THYPHODOSIA novum

Generic Characters.—A peculiar genus, with the habits of a thysanurine and the plumose siphon of a dentate. From at vertex about one-fifth of the head width, gradually widened to anterior margin, each orbit about as wide as interfemur; with four supraorbital, the upper curved, forward, second curved, forward, third forward, and anterior pair curved forward, the three or four infraciliars all curved inward; all four verticals long, postverticals short and weak; collars but little stronger than the postverticals; oral tube conical at base of antennae; some short axile above each of the vibrissae, the latter long; antennae almost as long as the face, the latter slightly convex, not carinate centrally; proboscis short and stout; palpi normal. Thoracic bristles moderately strong; sternopleura 3 = 1; postabdominal wall developed; type specimen pinned so that it is impossible to see the prothorax. Abdomen narrowing oval, with apical bristles on tergite 2 to 4. Mid tibia with a median ventral bristle. First posterior cell ending in tip of wing, narrowly open, hind of fourth vein obsolete; inner cross vein close to middle of dorsal cell and a little posterior of apex of first vein; outer cross vein at about its own length from apex of fifth vein.

Genotype, the following species.

-Thypidosa primita sp. nov.


Orbits and palpuscilia without hairs; longest hairs on scapula as long as width of third antennal segment, length of latter over
three times that of second segment. Premaxillary acrostichals, two pairs; postmarginal dorsoventrals, four pairs. Fore tibia with a median posterior bristle; fore tarsus slender; femora sparsely bristled and rather stout.

Length, 4 millimeters.

Type, Los Balos, Laguna Province, Luzon (Baker).

Aria spicifera sp. nov.

Male.—Head testaceous, grayish yellow dusted, upper occiput fuscous; antennae and palpi fuscous; palpi yellow. Thorax black, gray dusted, not viellate. Abdomen yellowish, semi-ellipsoidal, apex of tergites, most of third and all of fourth fuscous, dorsum gray dusted. Legs testaceous yellow, bases of fore femora, apices of mid and hind pairs and at tarsi darkened. Wings hyaline, with a large fuscous spot extending from before apex of second vein to tip of wing and spreading over anterior half of tip of first posterior cell. Lower calyptra brown on disk. Halteres yellow.

Promeson normal; anterior orbital bristles extending below bases of antennae; third antennal segment very large, as wide as widest part of eye; aristas pubescent, second segment over four times as long as thick. Apical three tergites with marginal bristles. Legs normal. First wing vein seluuens at apex above and below, third seluuens at base below and on most of its length above; fifth bare; inner cross vein a little before middle of discal cell and apex of first vein; outer cross vein at about its own length from apex of fifth vein.

Length, 4.5 millimeters.

Type, Baguio, Benguet Subprovince, Luzon (Baker).

Genus MALATIA novum

Generic characters.—Belongs to the group in Tachinidae in which the first posterior cell is open and ends in the exact wing tip. Inner vertical bristles long, a pair of short incurred post-ventrals directly in line behind them, the outer verticals short; ocelli ovoid, procne, divergent; interior supraomblial directed forward; the fine lateral hairs descending in a series along inner margin of parafacial to middle of latter, at which point they begin to parallel or intermingle with those on lower half of facial ridge; face in type slightly transversely elevated on upper half, but this may be due to distortion, as the specimen is slightly immature; aristae here, second segment about as long as
thick; third antenellar segment about three times as long as second, and with a series of short fine setae along its outer edge; peduncus short and stout; palpi apparently present in type, but it is impossible to distinguish them clearly. PROSTERNUM base; sternopleura 1 + 1; hypopleural foveae; posteroventral small but distinct. Abdomen with apical bristles on tergites 1 to 4. Inner cross vein about one-third from apex of discoidal cell and distinctly beyond apex of first vein; bend of fourth vein about four-sevenths from outer cross vein to tip, from which point it runs diagonally forward to tip (fig. 1).

**Malaysia fuscicosta sp. nov.**

*Female.—Shining black. Interfrontalia brown, whitish distal; antennae black, reddish at base of third segment. Thorax gray-dusted, most distinctly so on sides of mesoscutum, and with two narrow black vitre between dorsocentrals and acrostichals in front of notae. A rather conspicuous fascia of white dust at base of second tergite. Legs black. Wing greyish hyaline, marked with fine cross, as in fig. 1. Calypters white. Halteres black.*

*Proxa at vertex about one-third of the head width, slightly widened anteriorly, each orbit as wide as interfrontalia, upper supraorbital distinctly in front of anterior ocellus, curved outward and backward, anterior one curved forward and situated close to level of the upper incised infraorbital; artista rather thick; third antenellar segment about four times as long as wide and fully three times as long as second; eyes narrower below; cheek about one-third of eye height. Thorax with 2 + 3 dorsocentrals, and only hairslike acrostichals. Fore tibia with two anterodorsal and two posterior bristles; mid tibia with an anterodorsal, one anterodorsal, and one postdorsal bristles; hind tibia with two anterodorsal, anterodorsal, and postdorsal bristles. Calypters rather small, rounded at apex, clear of scutellum at base. Length: 4.75 millimeters.*

*Type, Pahang, Cameron Highlands, Federated Malay States, 4,609 feet, at light, October 18, 1923 (Perdigeby).*
The outstanding feature of this genus is the setulose anterior (upper) margin of the third antennal segment; some other genera have this segment downy or pilose, but no other one known to me has it setulose, as here.

**From Palpontomia.**

Although the acceptance of tribes in this family is accompanied by many difficulties there are some which appear to be fairly well distinguished, and amongst these is the Palpontomia. The character of the palpiform apical lobe of the proboscis is a rather uncertain one to depend on, but the narrow, spirally rounded, lower calyptral, almost bare area, approximation of the apex of first posterior cell to the tip of wing, and the setulose pronotum, taken in combination, readily distinguish the genera from those of other tribes.

*Oebacteriopsis urinulae* Townsend.

Apparently a common and widely distributed species. I have seen it from China, Sumatra, Java, and the Federated Malay States. I have no doubt that it occurs in the Philippines.
ILLUSTRATION

TEXT FIGURE

Fig. 1. H. m. furcata ssp. nov., wng. 512
PHILIPPINE CRICKET-LOCUSTS (GRYLLACRIDAE)

By H. B. Karsy
Of Batanorg, Dutch East Indies

THREE PLATES

After having completed my paper on Philippine cricket-locusts (Gryllacridae), I received further material from Prof. O. P. Baker for determination. As was to be expected, the material contained several interesting specimens which are here presented.

VENATIONAL TYPE III (=?ERS)

Gryllacris pietha SMU.


Gryllacris pietha subsp. immaculata Grieffi. Plate 3, fig. 2.


One female from Mount Maquilling, Luzon (Baker); measurements intermediate between those of the female from Pollito and of that from Mount Maquilling. Tegumentation practically as in Plate 1b, fig. 2, but the pubescence very weak and indistinct; subcostal veins not simple, but simply forked before the end, the fork branches, however, much shorter than in fig. 2 of branches of R and Rs practically as in fig. 2; but much less divergent; following veins all as in fig. 2.

For shape of ovipositor see Plate 2, fig. 2.

Gryllacris pietha Grieffi. Plate 3, fig. 1.


Karsy, Phil. Journ. Sci. 24 (1908) 105-120.

When describing my subsp. immaculata, I had only one female, before me, and I could not find any differences between it and...
The true *nigrogenulata* other than color characters and a very slight difference in shape of ovipositor. Therefore, I believed it to be nothing but a mere color race of *nigrogenulata*, and could not identify it with a different species. Now I have from Professor Baker a male from the same locality, which belongs without doubt to the same form as the tristis female. This male, however, differs from *nigrogenulata*, not only in color characters, but also in the shape of the external genitalia (Plate 3, fig. 1); in fact, it differs so greatly that it must be regarded as a different species. On the other hand, it agrees fairly closely with *nigrogenulata*, the differences being only in individual characters. Therefore, *tristis* female must be placed with *nigrogenulata*, as it represents the hitherto unknown female of this Griffinian species.

The venation of the male now before me is practically the same as in the female previously described; the rich development of the median vein, especially, agrees very well, on both tegmina, with that shown in fig. 2 (female). The last and penultimate tergites, described by Griffin as "carunculae," are quite brownish black in the male before me. The genitalia also agree with Griffin's description, except that one of the two teeth of the ninth tergite is not detached by the subgenital plate in the specimen before me; these teeth become contusius disjunct. By comparing fig. 1 (Plate 3) given here with Plate 4, fig. 12, of *nigrogenulata*, it is evident that both are built, according to the same type but show differences of specific value; the teeth of the ninth tergite, especially, are somewhat differently shaped in the two species, and the styles are shorter in *nigrogenulata*, more inserted outside, and directed outward.

Measurements of *Griffiana* (see Griffin):

<table>
<thead>
<tr>
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<th>Female</th>
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<tr>
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<tr>
<td>Hind femora</td>
<td>15.5</td>
<td>16.0</td>
</tr>
</tbody>
</table>

The male before me is somewhat larger than Griffin's type specimen, and also a little larger than the female described as *tristis*.

One male from Samar, leg. Baker.

A bright species. General color yellow-brown, with shining black markings.

Ocellus strongly arched, brownish black, with a large yellow-brown H, the branches of which run forward against the fastigium, parallel with another one, and diverge backward strongly against the fore margin of the pronotum. From the upper angle of each eye runs a broad yellowish band above the anterior insertions mesad and forward, communicating with the anterior part of the H-branches; there is another, strongly impressed yellow band, from the upper angle of the eye against the hind margin of the head, along the sides of the occiput; cross before the hind margin arises a rather perpendicular, but strongly S-curved, yellowish line, which runs on to the gomph. Fastigium of vertex nearly twice as broad as first antennal segment, blackish, bent on either side, not keeled, and with a small, not well-defined, yellow occipital spot, the color continued backward to the H-branches of occiput, forward into a short, oblique, mesad-directed, yellow-brown streak. Antennae ferruginous brown throughout, arched margined below and inside broadly black. Border between fastigium of vertex and of front broadly black. Fronto-fastigium yellow-brown, with a very indistinct, small occipital spot. Forehead shining, yellow-brown, depressed against the dyscopes and becoming darker; on either side two impressed, circular, well-defined, black dots, arranged in a slightly oblique line which is about parallel to the lateral parts of frons; and almost so far from the latter as from another line. From the inner lower angle of the orbits runs an oblique black band mesad and downward, then suddenly oftentimes abruptly curved downward and continuing perpendicularly to the inner, impressed dot. Subocular furrow strongly impressed, broadened downward, broadly black. Mouth parts of usual shape, dark nasalean, mandibles even darker along the inside. Palpi long, apical joints somewhat thickened distally, that of labial palpi obliquely truncate and distinctly excavate at apex, much less broadened than in the species of the fumifera and fuscicollis groups. Genae strongly arched, shining black, with the yellowish curved line coming from the occiput and broadly yellowish below and behind.

Pronotum longer than wide, with rounded fore and truncate hind margin, yellow-brown, broadly margined with black all
Disk with a transverse furrow close behind fore margin, and another, strongly convex backward, before hind margin; both strongly impressed and broadly black. In the middle a rather narrow black band running throughout the whole length, and inclining in its middle part a slight, short, longitudinal sulcus. Laterally from the fore end of this furrow is a large, slightly impressed, black spot from which issues forward a short black streak; backward and outward, opposed to it, is the fore angle of a large, oblique, black triangle, the rear angle of which reaches the hind sulcus, and the lower angle is situated at the commencement of the hind branch of the Y-sulcus with the oblique hind sulcus of the lateral lobes. These furrows are both strongly impressed, broadly black, the spaces between them and against the margins strongly arched. The black color of the Y-sulcus is connected at its lower angle with the black of the margin; that of the oblique hind sulcus is also continued into the marginal black; above it is a second black band at the side of the discal metasoma, running from the large black triangle to the lateral angle of the truncate hind margin of the disk. Altogether, we have here a preoral picture of the signifera type, but more melanistic; that is, the black markings are more expanded and are partly confluent with one another.

Organs of sight (Plate 1, figs. 1 and 2) distinctly reaching beyond the hind knees, but not or hardly the end of the abdomen. Verruca of type III; that is, of the same type as in the Bornean species. 1 The tegminum whitish hyaline, with extraordinarily thick black longitudinal and cross veins; only the costal vein brownish yellow, but when approaching the fore margin gradually becoming darker, at least black too. Two preocnotes; at the end of the second one the fore margin is strongly excavated. Costal straight, at the excavation approximating close to the fore margin and reaching it near about in its middle. None of the terminal fields unusually broadened, all of about the same width. Subcosta bifurcates close before the end, reaching the fore margin about at the beginning of the apical third. Radial sector originating from radial vein about in the middle of tegmen, forked into three branches, the two apical ones extraordinarily short; radial vein itself bifurcates close before the end. Medial and subradial veins with a rather long, common stem which unites into those two chief veins about at the end of basal fourth of tegmenal length. Medial vein itself

1 Juturna, P. M. S. Proc. 15 (1933) 29-37, fig. 11.
again bifurcate on the left femur in the specimen before me, about in the middle of tergalium length, but the branches of the fork unite again, still before reaching the apical margin, while the median vein of right tegmen remains simple throughout. Cubital vein remaining simple on both tegmina. Behind the common stem of medial and cubital veins a distinctly impressed anal fold is visible, indicating with certainty that the stem is indeed M + Cu and not M alone. Behind it five simple longitudinal veins, the last two with a very short, common stem. Hind wings grayish hyaline. Costa and subcosta and the cross veins between them brownish yellow, all other veins strong, blackish, but not as broadly black as in tegmina. Preaxial fold very narrow, as in tegmina. Costal margin. Subcostal vein running in a forward concave bow to the fore margin, which it reaches about in the middle. Following veins arranged according to the same type as in tegmen; in the figure in my paper cited above, the names of the veins must now be corrected from those given in my earlier paper.* The veins indicated in the Journal of the Federated Malay States Museum, fig. 11, as R6, will be in fact R5 + M. M should be changed to Cu, and Cu will represent CuS. A definite decision on this point will be impossible, however, before the larval wing cases of the venous type have been studied—a study which it will not be possible to make in the near future because of the extraordinary rarity of specimens belonging to this type. Radial vein simply forked before apex, reaching the fore margin about at the beginning of its apical fourth. This vein sends forth, close before the middle, a short oblique cross vein (probably base of R5 + M, as I have indicated in Plate 1, fig. 5) which communicates with the longitudinal vein behind it (probably Cu) for a very short distance (much shorter than in re- sLua) and then, after leaving that longitudinal vein, again simply forked distal (probably into R5 and M). The following two longitudinal veins (probably Cu and CuS) with a short common stem, simple throughout. Also four large, anal veins numerous. Legs very stout, comparatively short. Cune yellow-brown, marked with shining black, fore tibia shining black nearly throughout. All femora and tibia shining black throughout, with a bright steel blue splendor. Fore and middle tibia with four pairs of moderately long, movable spines of the same black color as the tibia, but becoming yellowish at the tips. Hind

* Heterol. Mas Nat. 24 (1950) 54-56.
Femora very thick, with five to eight strong spines outside, twelve inside. Hind tibia unarmed below (except the apical spur); above complanate and armed with four or five strong spines outside, three or four inside, except the apical spines. All tarsi pale brownish yellow throughout, claws black.

Abdomen brownish yellow above and laterad, blackish below. Cord yellow-brown, about one-third the length of the ovipositor.

Subgenital plate (Plate 1, fig. 3) triangular, angularly excised at apex. Ovipositor moderately upcurved to the tip, which is rather acute.

**Measurements of Orphilis cyanipes sp. nov.**

<table>
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<tr>
<th></th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
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<td>Tegmina</td>
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<td>Femora</td>
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<td>Hind femora</td>
<td>3.4</td>
</tr>
<tr>
<td>Ovipositor</td>
<td>15.1</td>
</tr>
</tbody>
</table>

One female from Samar (Boracay).

This new species is without doubt closely related with the Boracay species, the only species hitherto known to represent the same type of venation. *Orphilis cyanipes* differs, however, from venom by the shining black markings of head and pronotum, by the different shape of the female subgenital plate, and especially by the bright yellow femora and tibiae of all legs, which contrast strongly with the pale, yellowish tarsi.

Griffis's compared venom with venom the following species: principal venom from Lorna, in-tunnel from Lombok; venom from Boracay, and venom from Annam. I have had occasion to study only venom, and found it to differ widely from venom and cyanipes. Its venation being according to type H. Of the three others, it is not possible to ascertain whether they agree in venation with venom or with venom and cyanipes. If any conclusion can be drawn from the length of the hind femora, it should be expected that venom and cyanipes are more closely related with venom, while the length of the tegmina would place prophila also much nearer to venom than to venom and cyanipes. On the other hand, venum should probably be placed nearer to venom and cyanipes, if it is not related with the boracay and perspecta.
groups and thus representing type IV. These points cannot be
definitely determined until the variation of all these species shall
have been studied. At all events, species differs from all of
these species at first view by the very distinctive color of the legs.

VENATIONAL TYPE V

Grylletia cerinana Karsan.


Grylletia cerinana subsp. cerinana subsp. nov. Plate 2, figs. 1
and 4; Plate 3, fig. 5.

Very near in size and appearance to the typical form, but the
general color somewhat paler, more yellow-brown. Head quite
paler, concolorous, except the black eyes, and the labrum which
is yellowish in the middle, broadly bluish brown laterally and
below. Ocellar spots small, yellow, indistinct. First antennal
segment infuscated at apex, second basad and distad, others con-
colorous, ferruginous.

Prosternum as in typical rectinana. Tegmina also practically
as in that form, the variation, however, somewhat different, but
this may perhaps be a mere individual variation (Plate 3, fig.
5). Coastal area somewhat wider. Radial sector on left teg-
men simple, arising from radial vein more basad, close behind
the middle of the tegmental length, therefore before the first
fore branch of the radial vein; on right tegmen practically as in
typical rectinana, but the apex of the radial vein, after
emitting the sector, simple, not forked again. Radial vein on
both tegmina coalescent with cubitus at the very base only, thus
practically free, further simple, not forked as in the typical
form. Cubital vena distinctly furcate before the middle on both
tegmina. Following veins as in typical rectinana, but the last
and more abtrive, on left tegmen (Plate 3, fig. 5) even more
than on right. Hind wings practically as in the typical form.

Legs pale, testaceous, only the base of tibiae black, on fore
and middle legs for about 1.5 millimeters, on hind legs for 2.5
millimeters; apex of hind femora somewhat infuscated. Spines
of all legs as in the typical form, those on hind tibiae black
throughout and with a black spot apressed at their bases.

Ovipositor (Plate 2, fig. 1) as in typical rectinana, quite
straight. Subgenital plate of female flattened, acuminate at

*Phil. Jour. Sci. 20 (1905), pl. 2, fig. 1.
there is no doubt that we have here a form differing quite
the same type in Luzon as that represented in Mindanao by
the typical reticulada. The question is only whether ochropis should
be considered a mere local race or a separate species. The gen-
eral appearance is very near to typical reticulada and the dif-
fferences consist in mere color characters; on the other hand, the
shape of the subgenital plate of the female is so different
that it should be perhaps expected that the males, when they
become known, will also show valuable differences in the shape
of the exter nal genitalia. Then it would perhaps be neces-
sary to consider reticulada and ochropis as different species,
but this question cannot be definitely decided until further
material (especially males) of both can be studied. It is a
very regrettable fact that nearly all the species and subspecies
of Gyratrix are represented in Professor Baker's collection by
one specimen only, so that it is practically impossible to give
entirely satisfactory descriptions; therefore, many important
systematic problems must remain undecided for the present.

Gyratrix reticulada subsp. ochropis subsp. nov.
Plate 1, figs. 4 and 5; Plate 2, fig. 5.

Very similar to typical reticulada, but somewhat larger and
paler. Color of head much as in the typical form. The pro-
notum, too, offers no usable difference.

Tegmina larger and especially broader than in typical rett-
culada, the venation, however, according to the same type (Plate
1, figs. 4 and 5). Radial sector arising from radial vein on right
tegmen before the middle three-branched, while the radial vein
itself is simply forked: on left tegmen radial sector and radial
vein grown together throughout, this R + Ra being five-branched,
forward perpend. Medial and cubital veins with a short but
distinct common stem, the former simple on right tegmen, furcate before the middle on left tegmen, the latter simple on both. Following veins practically as in typical recticulata, as is also the case with the venation of the hind wings.

Legs pale throughout, brownish yellow, only the hind femora slightly infuscated at the very extreme tips. Spines as in the typical form, seven to nine on the hind femora outside. Left hind tibia with six spines outside, seven inside, right with seven outside, six inside. All spines of hind legs pale based, darkish at their tips.

Apical temple of male (Plate 3, fig. 3) enlarged, with a broad, shallow longitudinal furrow; produced at apex in two very small, acute, straight, curved spines, which are black at the tips. Subgenital plate strongly transverse, very short; apical margin emarginate with broadly rounded lobes. Stylus lateral, very short and thick.

Measurements of Gryllaria recticulata subsp. ochrocephala subsp. nov.

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<td>Pronotum</td>
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<td>Mesonotum</td>
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<tr>
<td>Fore femora</td>
<td>1.6</td>
</tr>
<tr>
<td>Hind femora</td>
<td>1.4</td>
</tr>
</tbody>
</table>

One male from Samar (Bicker).

Thus, ochrocephala represents the recticulata type on Samar; it is distinguished from both ochrocephala and typical recticulata by the rather pale tibiae, from ochrocephala by the color of forehead which is the same as in typical recticulata. As with the preceding form, nothing can be stated with regard to the systematic rank until males of recticulata and ochrocephala and females of ochrocephala are known. The great similarity between ochrocephala and recticulata would suggest that the male sexual organs of the latter will be found to be shaped according to the same type as in ochrocephala, but no definite statement can be made on this point until the males of recticulata have been studied.

Gryllaria elliptica sp. nov. Plate 2, figs. 3 and 5; Plate 5, fig. 4.

A small species. General color ferrugineous. Antenna ferrugineous yellow, first to third joints infuscated based. Eyes dark, oval, about twice as high as long. Fastigium of vertex somewhat narrower than first antennal joint, sharply keeled.
lateral. Both fastigia, margins of antennal scrobes, and the entire front dark brownish black. Ocellar spots very indistinct. Forehead much wider than high, smooth, with some very small, pin-pricklike dots, and under the magnifying glass very finely and densely rugose. The blackish color of the forehead becomes gradually paler laterally, quite vanishing at the subocular sulcus; this distinct in its lower part (above the base of mandibles), shallow, triangular. Crown brownish yellow. Clypeus dark brown, gradually becoming pale yellow below. Labrum blackish. Mandibles ferruginous. Palpi long and slender, the maxillary ones longer than the head is high, labial palpi hardly half as long. Apical joints somewhat thickened distally, those of the labial palpi much stronger than the maxillary ones; the former very slightly truncate at apex, the latter transparently, both with strongly excavate apical area.

Pronotum brown, unicolored; sculpture of disk very shallow, almost indiscernible, while the V-shaped and the oblique hind side of the lateral lobes are strongly impressed, the areas between them strongly arched. Fore margin of disk roundly produced in the middle, hind margin roundly truncate. Lateral lobes triangular, with rounded angles. No humeral sinues. Posthumeral teeth short and thin, directed horizontally backward.

Organs of flight shortened, hardly reaching beyond the hind knees and the apex of abdomen. Tegmina (Plate 3, fig. 4) ochreous, becoming paler and slightly more hyaline toward the tip, with somewhat darker ferruginous veins. Three precostals. Costal veins slightly curved. Forewedge convex, simple, reaching the fore margin distal from the middle. Costal area somewhat enlarged. Subcosta curvate, convex backward, simply forked distally. 

Radial vein practically straight throughout, without a separate sector, diverging in the apical part into three (right tegmen) or four (left tegmen) branches, all of which reach the fore margin even before the apex. Medial vein free from base, nearly straight, reaching the radial vein at one point about in the middle (left tegmen) or communicating with it for some distance distal from the middle (right tegmen), then becoming by this communication actually a Rs+M, which is simply forked on right tegmen, and four-branched (backward pectinate) on left tegmen. Cubital veins exceedingly developed as both tegmina, forked before the middle, the fore branch then forked again about in the middle of the tegmen, the
hind branch remaining simple. Following veins simple, four in all, first and second distinctly S-curved. Hind wing cubital, grayish hyaline, with dark ferruginous veins. The poor condition of the specimen does not permit description of the venation.

Legs stout, brownish yellow, all tibiae paler than the femora, but blackish at the extreme base for about 1 millimeter on fore and middle legs, for 1.5 millimeters on hind legs. Femora not darkened at the tips. Fore and middle tibiae with the usual four pairs of mesocercal spines which are as long as or hardly longer than the tibia in broad, gradually becoming shorter distally. Hind femora very thick, with five to eight dark brown spines outside, ten to twelve smaller ones inside. Hind tibiae on each margin with six blackish spines and with a comparatively large shining black spot at the base of every spine. Tarsi pale, yellowish, claws black at tips only.

Ovipositor (Plate 2, fig. 1) strongly recurved, short, broadest near base, gradually tapering to middle, from here to close before tip remaining nearly equally wide, at the tip somewhat obliquely truncate above. Subgenital plate of female rounded trigeminal, with a large, oval, transverse pit showing two small longitudinal lines (kinds?) in its middle. At the border between subgenital plate and the preceding sternites, there is visible a small circular pit in the middle.

Measurements of Orpharitis petallaria sp. nov.

<table>
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<tr>
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<th>mm</th>
</tr>
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<td>6.8</td>
</tr>
</tbody>
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One female from Mount Banoa (Rafinesque).

In its small size the present insect somewhat resembles the species of the petallaria group* but differs from all of these at once by the color of the forefemur. In this respect, it agrees with *kristoffi, a species I know from Brunner's description only. As Brunner says nothing about the shape of the fastigium or of the temporal venation, I cannot decide whether the species

are really related or not. At all events, petalonia differs from
insects by the much shorter ovipositor and by the different
shape of the female subgenital plate. The dark forehand also
somewhat resembles that of recticinodes; but no large, yellow,
lower ocellar spot is present in petalonia as there is in recti-
cinodes. Further, the insect is smaller, the venation different,
and the shape of the ovipositor quite different. By the same
characters, petalonia may be distinguished also from pelobus,
in which it would belong according to Griffith's key.

The arrangement of terminal veins in the specimen before
me is very curious and differs from all likewise known Gephyraea
venation. It may, however, be placed with type V, but cannot
be identified with either Va, Vb, or Vc (see Lecane type). If
the present speciment were not abnormal (but the veins are
arranged according to the same type on both tegmina), it
should be distinguished as a distinct subtype (Vd), characterized
by the strongly developed costal vein and, especially, by the
head free media communicating with the radial vein and then
running farther as Rs + M, therefore without a separate radial
sector. This omission of Rs with M results in a somewhat type
II, of plebicin imagines and of chironorvs, but in all these cases
the base of the radial sector is developed as a distinct, differ-
ent cross vein connecting the radial vein with the media, whereas
in petalonia the latter vein communicates with the radius, not
leaving even the extreme base of the radial sector free. Further
material of this remarkable species is needed to show if this cu-
rious venational type is constant in this species.

Gephyraea legipusia sp. nov. Plate 2, figs. 6 and 7; Plate 3, fig. 2.
A rather small species. Foregirnous yellow, practically uni-
coarous. Head oblong, when seen from front. Eyes ovate, shin-
ing black. Funiculium of vertex somewhat wider than the first
antennal joint, very broadly rounded lateral, nearly rounded, about
as in recticinodes. Ocellar spots rather indistinct. Forehead
smooth, not with a few bug hairs, depressed below. Subocular
scales distinct though shallow, slightly S-curved. Mouth parts
conical, labrum only somewhat darkened. Pronotum rufous

"Ibid. 5, M 20 (1920) 45-65.
"Treculta 2, 3, 4 (1912) 61.
"Treculta 2, 4, 5 (1926).
brown, somewhat nebulous; shape and sculpture practically as in the preceding species.

Organs of flight reaching a little beyond the end of the abdomen, touching the hind knees. Tegmina (Plate 2, figs. 6 and 7) ferrugineous yellow, gradually becoming somewhat grayish hyaline before the tips. Veins ferrugineous yellow, arranged according to type Ve. Two or three precoxal. Costal vein simple, curved, forward convex, reaching the fore margin distal from the middle. Costal field broadened near its middle, tapering distal. Subcostal vein curved, backward convex, simple, reaching the fore margins at the beginning of the apical third. Radial vein curved forward, simple on right, simply forked on left tegmen. Radial sector arising from radial vein in the middle on left, distal from it on right tegmen, simply forked. Bound from radial sector there originate from radial vein the media, which is simply forked about in the middle of tegmen (left tegmen), or three-branched (in right tegmen). Cubital vein simple on both tegmina. All these chief veins show a certain tendency to oblongoquadrate deviations, thus forming some irregularly polygonous cells, especially in the distal part of tegmina. Behind the cubital vein there follow four simple longitudinal veins, the last two of which originate from a very short common stem.

Hind wings ciliated, hyaline, with yellowish longitudinal and dark brown cross veins. Costal marginal. Subcostal vein simple, curved forward, reaching the fore margin about in its middle. Radial vein practically straight, ending about at the tip of the wing, emitting two oblique cross branches against the fore margin. Cubital stem communicating with radius in basal part; from there originates a common stem (Rs + M + Cu), which emits after a short distance a simple longitudinal vein (Cu); then about in the middle of wing length a second one (M1), at last bifurcated before the end (Ro), those forked branches about half as long as their stem.

Legs moderately long and rather stout, unicolored. The movable spines (four pairs) on fore and middle tibia usually long, the second somewhat more than twice as long as the tibia is wide, then decreasing in length distad.5 Hind femora, too, of a similar shape as in that species;1 with eight rather short

1. Gryllus ornatus,rolea, Philip. Jour. Sc. 29 (1838) pl. 4, fig. 5.
3. R. ornatus.---
spines outside, eleven or twelve inside. Spines of hind tibia unusually long, almost as long as the tibia is broad, directed obliquely backward, seven on each side. All spines of hind legs with blackish tips.

End of male abdomen (Plate 6, fig. 23) concolorous. Eighth tergite enlarged, produced backward. Apical tergite perpendicular, with a median length spine and an evenly rounded general outline, but at the tip produced into two long spindleshape processes, which are crossed and strongly produced horizontally lateral. Genital rather short. Subgenital plate transverse, with reduced, nodiform styles.

Measurements of *Gyrilaela longipennis* sp. nov.

<table>
<thead>
<tr>
<th></th>
<th>Male</th>
<th>mm.</th>
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</thead>
<tbody>
<tr>
<td>Body</td>
<td>13.0</td>
<td></td>
</tr>
<tr>
<td>Proxim</td>
<td>4.0</td>
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</tr>
<tr>
<td>Tergites</td>
<td>3.0</td>
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<tr>
<td>Prosterna</td>
<td>1.0</td>
<td></td>
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<tr>
<td>Elb. femora</td>
<td>1.4</td>
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</tbody>
</table>

One male from Samar (Baker).

The new species in many respects resembles *Gyrilaela commensalis*, with which it would be placed, according to Grinnell's table (1915). It differs, however, by its terminal venation and by the shape of the apical tergite, which are quite different. The former agrees with types V6, and no species of this type are yet known from the Philippine Islands. By this it recalls the Javanese pollisels, from which it differs, however, by the other characters, especially by the pale festiga and by the apical tergite spines, which are much longer and stronger than in the Javanese species. The shape and armature of the legs recall *Gyrilaela longipennis*, but the tegmina are much longer in the latter and represent a quite different venational type. Finally, there seems to be much resemblance to *solitario*, but the male sexual characters show great differences, as described by Grinnell (1914).

**VENATIONAL TYPE IV**

*Gyrilaela longipennis* Grinnell, 1914.

Assemblage: *Gyrilaela longipennis* (Grinnell, 1914); *Gyrilaela solitario* (Grinnell, 1914).

One female from Cebu (Baker) agrees very well with Grinnell's description (also in the shape and length of the ovipusser),
but has the disk of the pronotum infuscated, especially along the fore and hind margins and along the edge; lower part of lateral lobes pale yellowish. All femora have the outer lower cornea blackish; the long movable spines of fore and middle tibia also grayish black, except at the tips, which are pale yellowish.

*Graphocephala muscula delcrosia* Griffith.

*Graphocephala muscula delcrosia* Griffith, KANNY, Phil. Trans. Soc. 28 (1223) 104.

One male from Los Baños (Baker) quite agrees with Griffith's description, but is conspicuously smaller.

Measurements of *Graphocephala muscula delcrosia* Griffith.

<table>
<thead>
<tr>
<th>Length</th>
<th>Head</th>
<th>Pronotum</th>
<th>Thorax</th>
<th>Fore femora</th>
<th>Hind femora</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5</td>
<td>0.3</td>
<td>0.3</td>
<td>0.4</td>
<td>0.4</td>
<td>0.4</td>
</tr>
</tbody>
</table>

The blackish labrum and the curvose shape of the male apical tergite, described by Griffith in 1915, are very distinctive.
ILLUSTRATIONS

PLATE 1

PL. 1. 1. Gryllus cervinus sp. nov., male; 2, tegmen; 3, fore part of hind wing; 4, subgenital plate.
4 and 5, Gryllus certhia sp. nov., male; 6, left tegmen; 7, right tegmen.

PLATE 2

PL. 1. 1. Gryllus certhia sp. nov., male; 2, tegmen; 3, fore part of hind wing; 4, subgenital plate.
5 and 6, Gryllus certhia sp. nov., male; 7, right tegmen.

PLATE 3

PL. 1. 1. Gryllus mecius sp. nov., male; 2, tegmen; 3, subgenital plate.
4 and 5, Gryllus mecius sp. nov., male; 6, right tegmen.

PAGE 2
FOUR NEW PHILIPPINE FISHES

By ALVIN B. HOBBS
Chief, Division of Fisheries, Bureau of Science, Manila

Preface:

The family Balistidae contains about fifty species of tropical reef and shore fishes, many of which attain a rather large size. They are of particular interest because some of them are dangerous to use as food, their flesh being more or less poisonous. I have given a detailed account of the Philippine balistids, or trigger fishes, in an earlier paper. To the genera and species there described I am now able to add a new species belonging to a genus not previously known from the Philippines.

Key to the Philippine genera of Balistidae.

a. Teeth white.
   b. Teeth brown, yellow, or less deeply reddish.
   c. Caudal peduncle rounded laterally.
   d. A groove in front of eye.
   e. Several enlarged bony plates behind gill opening... Batophorus
   f. Scales covered by warty scales
   g. No grooves before eye... Balistoides
   h. Teeth green or red... Balistoides

Genus CAMBNUS Swainson

This genus resembles Balistus in relation except that there are no bony plates or enlarged spines behind the gill opening; the thick rough scales do not overlap and may be comparatively smooth, or there may be several to many rows each with a spine or keel, especially on the caudal peduncle, which is laterally compressed like the body; the body is more elongate than in Balistus; the cheeks are completely scaled, with a deep, rather short groove before each eye; dorsal spines three, fitting closely into a deep groove when depressed, the first one very large;

Philip. Journ. Sci. 15 (1864) 435-449. 189
the soft dorsal and anal much elevated anteriorly; the pelvic flap comparatively small, with a blunt, immovable spine.

Species new; intertidal, south to the Cape of Good Hope, north to Japan.

Caridlemia valida sp. nov.

Dorsal III-III-22; anal III-20; there are 42 scales from the upper angle of the Gill opening to the end of the vertebral column, with 3 or 4 more scales extending upon the caudal fin, and 28 scales in a transverse series from the origin of the second dorsal to the vent.

The elongate body much compressed laterally, its depth 2.96 times in the length; the head elongate, the dorsal and ventral profiles about equally convex, wider than the body, 3.4 times in the length; the snout 1.65 times in the head; the eyes circular, high up, 4.7 times in the head, 2.85 times in the snout; the interorbital space angular, keeled, 1.85 times the eye and a little more than 2.5 times in the head; the Gill slits little inclined, nearly an eye diameter behind the eye, the upper end below the level of the lower margin of the eye; the scales all have a central granular patch, and most of them on the sides are keeled; the scales between the soft dorsal and anal much larger than elsewhere, those before the first dorsal and about the eyes smallest, the head scaled to the lips; the first dorsal spine rough granular, 1.95 times in the head, when depressed into its groove it is flush with the body; the anterior portion of the second dorsal and anal greatly elevated, Falate, the longest dorsal ray 2.14 times, the anal 3.2 times in the length; the depth of the caudal peduncle 2.5 times in the head; the caudal bilobate, the lower lobe longest, a trifle more than the head; the pectoral 2.16 times in the head, placed just below and behind the Gill opening; the ventral spine broad, imbricated.

The color in life was uniform brownish violet, the top of the head and the snout brown, the fins all brown. The color in alcohol is little changed, the violet less evident.

Here described from the type, caught with hook and line at Manilac, one of the Capilay Islands in the Sulu Sea, September 22, 1928. It is about 390 millimeters long.

This species has proved to be common on rocky reefs in the Visayas, large numbers having been caught recently by Japanese fishermen using the Muro Arti method. I have three fine specimens, 260 to 388 millimeters in length, taken at Bennett Island, off the coast of Masbate. Fish of this species were
caught by the boatload off the coasts of Tablas and Marinduque. They are rarely eaten and the Japanese fishermen make no attempt to sell them, but throw them away.

**BRANCHIOSTEGIDAE**

The body elongate or laterally compressed, the head subconical. Dorsal profile usually convex, often strongly so; there is no bony suborbital ray, the cranial bones are not cavernous, and the opercular bones are usually unarmed; the mouth terminal, oblique, with strong teeth, none on vomer or palatines; the premaxillaries protractile, usually with a broad posterior tail, such as in the Labeidae; maxillary without supplemental bone, not splitting under edge of premaxillary; scales small, ctenoid; a lateral line present, usually following the dorsal outline; dorsal fin long, relatively low, continuous, the spines part much less developed than the soft portion; anal fin very long, spines few, feebly; ventral thoracic, 1-6, close together; gills 1, with a long slit behind the fourth; pseudobranchia well developed; gill membranes separate or more or less united; lower pharyngals separate; pterygoid long, hourglass-shaped, resting on both opercula; pyloric caeca few or none; vertebrae 24 to 33.

Fishes of temperate and tropical seas, some of them large and excellent food fishes.

**Genus BRANCHIOSTEGUS** Rafinesque


*Lateo Cuvier and Valenciennes, Hist. Nat. Poiss. 3 (1828) 277.*

The elongate, laterally compressed body covered with moderate to small, silvery, finely ctenoid scales; the mouth oblique, rather large, the jaws about equal, with rather strong teeth in the outer row, the inner teeth small, the posterior canines small; the posterior edge of the premaxilla finely serrate, the operculum entire; the lips without appendages, and there is no adipose appendage on the pectoral fin, six branchiostegals; air bladder simple; pyloric caeca few.

Species few, mainly in the East Indies, north to Japan.

*Branchiostegus stramineus* sp. nov.

Dorsal VII-VIII; anal II-III; lateral line 69 to 72; scales in transverse series opposite origin of anal, about 22.

The head and body strongly compressed laterally, the body elongate, tapering, its depth 3.75 to 4 times in the length; the larger, deep, boldly convex head 2.49 to 3.68 times in the length.
its depth almost equal to that of the body; the snout very steeply inclined, 2.64 to 2.76 times in the head; the large eyes 3.5 to 3.65 times in the head; the interorbital a little less than an eye diameter; the nape produced into a low keel; the mouth large, oblique; very low, the jaws subequal, the posterior angle of the maxillary beneath the pupil of the eye; the upper jaw has an outer row of strong sharp teeth and two inner rows of very small sharp teeth, with four short inner rows at the symphysis; the last tooth of the outer row is a small, hooked, forward-pointed canine; the lower jaw has an outer row of strong teeth as is the upper jaw, and five inner rows of much smaller teeth anteriorly, reduced to one inner row posteriorly; the body everywhere covered with medium-sized scales, apparently cycloid but really very finely ctenoid, the nape scaled forward halfway between the eyes with smaller scales than on the sides, the species and cheeks scaled as far as a perpendicular line from the eye to the angle of the mouth, ten rows of scales on the proporgia; the posterior margin of the proporgia finely toothed; the anterior portion of the dorsal fin, the seventh spine longest and approximately one-third the depth, the rays higher, the anteriormost longest, extending on the caudal when depressed, 1.1 to 1.2 times in the depth; the anal shorter and fewer, 1.55 to 1.77 times in the depth; the depth of the caudal peduncle 1.12 to 1.32 times in its own length, 2.64 to 2.76 times in the head; the caudal subtruncated or with unfiliform margin, 4.4 to 4.7 times in the length; the base, narrow, pointed pectorals nearly equal to the depth, 1.1 to 1.2 times in the head, the lower rays abruptly shorter than the middle ones; the origin of the ventrals a little before that of the pectorals, the line narrow, pointed, about 1.75 times in the head.

The color of fresh specimens was silvery, with a roseate flush along the upper half of the body, the snout bright deep pink; a pearl-colored band crossed the snout in front of the eyes; from the lower front margin of the eye a wide pearl band, rapidly narrowing, descended to the upper lip; from opposite the posterior margin of the pupil a silver band crossed the cheek nearly vertically to the throat; a large, dark brown spot above the origin of the lateral line; a black longitudinal line on the middle of the ridge crossing the nape; the dorsal spines with a black margin; the upper part of the entire dorsal was yellow, with a band pearly head along its whole length; about six yellow bands on the upper two-thirds of the caudal, running back and
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a little diagonally spread, the lowest one separated from the rest; each half above the lateral line with a small dark spot, these spots forming longitudinal rows; below the lateral line a poorly spotted on each scale; these spots also forming faint lines; the pupil very large, black.

In alcohol the rostrum flush and pick have disappeared and the fin markings are all gone; otherwise the color and markings are the same as when fresh.

Here described from three specimens, 289 millimeters long, collected by me in the Manila market.

* Syncretsops olympicus sp. nov.

Dorsal 12-13; anal 12; pectoral 1-9 or 1-10; scales in the lateral line 41-43; from tail to point of division below pectoral; 4 or 5 more to isthmus, 3 or 4 on vertical line to base of pectoral; 77 to over 80 scales from the upper angle of the gill opening to the caudal.

The eliptic head and body hexagonally compressed, the breadth of the body 1.75 to 1.85 times its length, which is 7.6 to 7.85 times in the length; the head from the tip of the upper jaw 4.15 to 4.35 times in the length; the entire head to the tip of the lower jaw 1.9 to 1.95 times in the length; the lower head, beyond the tip of the upper, 2.1 to 2.3 times in the length; the eye large, circular, very high up, its upper margin flush with the interorbital thread profile, 1.67 to 1.6 times its length; the posterior limit of the head and warmer than the interorbital space, which is 0.85 to 0.95 of an eye diameter in breadth; the breadth of the triangular part of the upper jaw equals its length, only above, the front margin of the preorbital rounded. 2.16 to 2.35 times in the eye; the small central sharp-pointed tooth in a band of four rows in each jaw, the bands widest anteriorly; the origin of the anal opposite the third or fourth dorsal ray; the dorsal low in females, much higher and centrally pointed in males; in the latter the fifth or sixth ray, or both, much elongated and thickened, the curved tip extending to or upon the caudal, the longest ray equal to the distance from the front margin of the eye to the posterior extremity of the head; the base of the anal 3.35 times in the length of the dorsal base; the anal in females transformed, not exposed; in males the anal rays in three groups, 5 or 6, 6, the sixth ray greatly widened and thickened, but not greatly elongated, never reaching the caudal; the three succeeding rays similar but successively much narrower, the skin accenuated upon.
and adhered to them, the last four rays in a deep pit; the whole fin somewhat con cave posteriorly; the narrow, pointed pectoral 1.06 to 1.17 times in the head to the tip of the upper jaw; the ventraIs very far back, 2 to 3/4 times in the length of the pectoral; the distance from the base of the ventraIs to the caudal twice or about twice in the distance from the ventral base to the tip of the upper jaw; the caudal emarginate, the lower lobe somewhat larger and longer than the upper, 5.3 to 5.8 times in the length; the scales deciduous, especially ventrally.

The color in alcohol uniform yellowish brown, with a broad silver band from the angle above the pectoral base to the caudal, widest posteriorly, with a black line along its upper margin; the sides of the head silver, the operculum and side of the lower jaw brilliantly so; the flank blackish; the basal half of the dorsal, behind the fourth ray, black or blackish brown; the caudal more or less yellow or brownish on its base, the rays somewhat dusky; the other fins colorless.

Here described from nine specimens, 100 to 110 millimeters in length, from Pinanampuan River, Tuguegarao, Cagayan Province, Luzon. This is a fragile little fish and but a few of the specimens are in good condition.

PHALLOSTETHIDAE

This extraordinary and anomalous group of little fishes, belonging to the order Cyprinodonti, seems to be well represented in the Philippines. In an earlier paper I presented a new genus and two new species belonging to this family. I have just received from southeastern Luzon representatives of a new genus which has some characters not hitherto found in the family. In the genera hereinafter to be described, the scales extend upon the head. The males in this family differ remarkably from the females in having a large muscular organ attached to the lower side of the head and throat, bearing one or two elongate, slender external, more or less movable bones and a prehensile structure, the tip of which the ray delimits ends. This whole organ is a priapulum, or copulatory organ. The intine runs forward and coils within the priapulum, opening upon its surface. Further details of this family structure are in my previous article cited above and also a paper by Regan. 1

In the genus here described the priapulium has some features not found among the previously known members of the order. As yet this group of fishes is known only from brackish water in Johore and Singapore and from fresh-water lakes and mountain streams of Luzon.

Key to the genera of Phallosomidae:

a. Two dorsal fins, the first of two spines
   b. One dorsal fin
   c. Scales enlarged near eye; operculum united; teeth in three or four rows; anal fin 2-3; males with a long external spire; prismatic bone and a very short curved one beside it: Phallosomidae
   d. Head and upper half of body naked; teeth in one or two rows.
      e. Dorsal 5 or 6; anal 2-3 to 5; scales 20 to 37; males with a long, smooth, curved external bone (or tooth) at the clasper, on the prismatic bone.
      f. Dorsal 1-3 to 5; anal 2-25 to 27; scales 48; males with an anterior, smooth, tubular external bone, the taeniatinum, and a take posterior serrated bone, the clasper, on the prismatic bone.

Genus MEGOSOMIDUS novus

This genus differs from the other members of the Phallosomidae in having scales on the snout and posterior part of the head up to the interorbital space, and in having the operculum covered by a few large scales. In addition, the males have a priapulium unlike that of other genera. In Megosomidus the priapulium is shaped something like a scalene triangle, its long side attached to the underside of the head and thorax, from the posterior part of the lower jaw to beneath the base of the posterior. The lower posterior angle of the priapulium is irregular in shape, with a rounded protruding hump which bears on one side a long, slender, cylindrical bone extending forward as far as the mouth and curving over to the opposite side from its origin; this is the equivalent of the toxastrium in Regan's description of Phallosomidae; in the inner angle and at one side of its expanded base is a short, curved, projecting organ with a supporting bone which projects in a very short, sharp claw at the tip; this seems to be the equivalent of the base on Phallosomidae named the clasper by Regan: the priapulium ends at the posterior angle in a soft hump from which grows a small, very slender, curved and twisted, apparently tubular organ which is recurved upon the priapulium and fits into the hollow between its origin and the base of the toxastrium. Its more or less hard and semiserous tip projecting upward between the base of the tox-
acclinum and the clacclinum; at its tip is the opening of the
var defonse.

The prismatic does not extend very far, but is folded
over near its middle so that it fits closely against the head and
throat; the tentaculum then lies along the surface, its tip
curving across the base of the lower jaw; the appendages of
the prismatic may be on either the right or the left side; when the
prismatic is unfolded, as it must be in copulation, it hangs down
as far as the abdominal outline and its appendages are in a
position very different from the usual one.

In the female the prismatic is represented by a broad thickened
ridge; on its anterior half in the median line is the anal opening
and a little below in the middle is the larger genital opening; at
the posterior end is a short thick shaly papilla. Vertebrae 26.

Mvitaa, wonderful; sholaa, the copulatory organ.

Mesophilus hikiarrei sp. nov.
Dorsal 5-6; anal 1-14; there are 32 scales in a longitudinal
series, 6 in a vertical series from the origin of the dorsal, and
25 before the first dorsal.

The head and body strongly compressed laterally, slender,
elongated, the dorsal profile nearly horizontal, the ventral profile
much or less convex. In males the depth is 4.5 to 5 times,
the head 3.5 to 4.5 times in the length; the head pointed, with
short, blunt snout, nearly vertical mouth, and strongly projecting
chin, the tip of which rises to the dorsal profile; the large
strainer eye very high on, lateral, 2.5 to 3.8 times in the head,
from a little more to half more than the snout; the broad flat
or nearly flat interorbital a tenth to a fourth more than the
eye; the very minute teeth in bands; there are three rows in
the upper jaw, and four in the lower jaw; the lower jaw divided
into two parts by a toothless spire at the middle, the whole
head crescent-shaped; the posterior margin of the maxillary in
advance of or extending to a point beneath the front margin of
the eye; the dorsal highest anteriorly, 14 times to twice in the
head, very far back; the anal much longer than the dorsal, its
origins much in advance of the dorsal but in the posterior half of
the body, the spine low but the anterior rays high, becoming
progressively shorter posteriorly, 1.5 to 1.7 times in the head;
the pointed pectoral 1.5 to 1.3 times in the head; the caudal
slightly, narrow, truncate, equal to or longer than the head, rare-
ly a little shorter, 3 to 4.6 times in the head.
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Males a trifle slenderer, the depth 4.9 to 5.2 in the head, 5.5 to 5.7 times in the length; the eye 2.2 to 2.3 times in the head, and about a tenth less than the interorbital; the snout 1.3 to 1.4 times in the eye; in other measurements of the body and fins they do not differ from the females.

The color in alcohol whitish with a thin black line on the side, beginning high up a little before and above the posterior end of the pectoral and running back to the middle of the caudal; the dorsal scales outlined by circular black dots; the top of the head black, the snout, sides of the head, and chin thickly sprinkled with black dots; beginning forward of the anal fin a black line or row of black dots extends back at the base of the anal until it meets its fellow from the opposite side at the posterior end of the fin, and the two continue as one along the median line to the caudal; the dorsal and caudal are dusky, the other fins clear.

In males the ventral surface of the folded pectoral more or less blackened.

I have examined twenty-eight female specimens, 15 to 21 millimeters in length, and twenty-two males, 16 to 24 millimeters in length, from Lake Davao, Camarines Sur Province. From Lake Lansiay, Albay Province, I have four females, 19 to 27 millimeters long, and three males, 22 to 25 millimeters in length. This tiny fish is entirely unlike any other member of the family yet described.

 cheered, pertaining to the Bicol province.
ILLUSTRATIONS

PLATE 1
Centipede visna sp. nov., X 6. (Drawing by Antonio Carlini.)

PLATE 2
Brachipterus unicolor sp. nov., X 4. (Drawing by J. L. Niessen.)

PLATE 3
Hemimerus ecuana sp. nov., X 36. (Drawings by Pablo Brion.)

Fig. 1. Adult male, lateral view, showing the mandibles in a folded position; t. palp; p.s. palps; t. mandible; t. maxilla.
Fig. 2 to 4. Adult male, partial views, showing the mandibles in an unfolded position; f. ventral view of head; f, l.s. left side view of head; f. right side view of head.
Fig. 5. Adult female, ventral view; f. ovip. f. ovipositor.
Fig. 6. Adult female, ventral view of head.

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ERRATA

Volume 10, page 453, line 18, for körteile (Kiefl.) comb. nov. read körteile (Kiefl.) Murr.

Volume 11

Page 165, line 11, for Lepontichas effusissima Kleine. read Lepontichas effusissima Kleine.

Page 205, line 34, for F. brevistylata var. dehiscens Fawc. read F. brevistylata var. dehiscens Fawc.

Page 209, line 45, for T. longicorns sp. nov. read T. longicorns sp. nov.

Page 381, line 2, for P. philippiana sp. nov. read T. philippiana sp. nov.

Page 383, line 33, for T. minutissima sp. nov. read T. minutissima sp. nov.
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