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Comparative Study on the Species Austromenopon icterum (Burm.) and Austromenopon durisetosum (Blag.) (Mallophaga)

[Pl. XX—XXI and 6 text-figures]

Studium porównawcze nad gatunkami Austromenopon icterum (Burm.) i Austromenopon durisetosum (Blag.) (Mallophaga)

Сравнительные исследования видов Austromenopon icterum (Burm.) и Austromenopon durisetosum (Blag.) (Mallophaga)

Austromenopon icterum (Burmeister, 1838) was described from Scolopax rusticola L. A few years later Denny (1842) called in question whether Scolopax rusticola is really the only and appropriate host of Austromenopon (Menopon) icterum, for the specimen described by Burmeister (1938) had been found in the nest of this bird and not on the bird itself. Denny (1842) believed that A. icterum infests also Calidris alpina (L.) $(=Tringa\ variabilis)$. The later authors, as Burmeister (1838) before, recorded A. icterum only from Scolopax rusticola L. The description of A. icterum given by Giebel (1874) was ample for its days, but in view of the present state of knowledge of Mallophaga and the present methods of description of species it is none too satisfactory, because it does not present any dimensions of body parts and proportions between the dimensions, which are both so important nowadays. In addition, there were no accurate illustrations, and all the old descriptions referred to females of A. icterum. The male has been described only recently (Zeotorzycka, 1961). According to information given Prof. Wd. Eichler by Dr. S. von Kéler by letter in 1962, the types of A. icterum have been lost sure enough. Consequently, I have marked one male, slide no. 42/j/1-1, as the neoholotype, one female, slide no. 42/j/2-1, as the neoallotypoid, and 2 males, slide nos. 42/j/1-2 and 3, and 4 females, slide nos. 42/j/2-2 up to 5, as neoparatypoids.

The neoholotype and neoallotypoid are in my collection in the Institute of Zoology, Wrocław University.

Austromenopon durisetosum (Blagoveshchensky, 1948) is a similar species described from Capella gallinago (L.) relatively late and so far little known in literature. Blagoveshchensky (1948) published a laconic description of the male and female of this species, emphasizing the characters distinguishing it from A. icterum, which it resembles according to him. He found the following differences between the two species: both males and females of A. durisetosum have overall dimension and the dimensions of particular body parts smaller than those in A. icterum (female) and their parietal parts are less expanded to the sides. Blagoveshchensky completes his description of A. durisetosum by a comparison of the mean lengths and widths of the head and of the whole body of males with those of females.

In the description of the male of A. icterum (ZŁOTORZYCKA, 1961) I gave an analogous list of mean dimensions for 3 males and 5 females of this species. Moreover, I calculated the mean differences between the dimensions of A. icterum and those offered by Blagoveshchensky for A. durisetosum. I did not carry out a detailed comparison of these two similar Mallophaga species at that time, for I had not a male of A. durisetosum at my disposal. Now that Prof. Blagoveshchensky has kindly lent me the slides of specimens representing both sexes of A. durisetosum from his collection, for which I am greatly indebted to him, I am able to re-analise the characters of and the differences between the species A. icterum and A. durisetosum more closely.

I have been induced to take up this study, among other things, by the fact that in the key to the genus Austromenopon Bedf. both species are placed by CLAY (1959) under one common diagnosis, which goes as follows:

"M. p. s. 3 (marginal prothoracic seta 3) * thin, reaches to or nearly to end of prothorax and its alveolus is submarginal near that of m. p. s. 2; d. h. s. (dorsal head setae) 1 a. 4 long (fig. 5) (=contour of left half of head of male A. durisetosum); inner lateral thickening well developed on II—VIII; genital sac without the heavily sclerotized pointed clerite shown in fig. 29 (=genitalia of A. phaeopodis (Schrank)); female ventral sclerites not as in fig. 41 (=edge of vulva and terminal ventral sclerites of female abdomen of A. erocatum (NITZSCH))."

This short diagnosis undoubtedly introduced some new important characters into the descriptions of *A. icterum* and *A. durisetosum*, but it did not advance the matter of differences between the two species at all.

The following slides of A. icterum and A. durisetosum from my collection were used for the present study:

Slide nos. 42/j/1—1 to 3: A. icterum, 3 \circlearrowleft from Scolopax rusticola L. Slide nos. 42/j/2—1 to 5: A. icterum, 5 \circlearrowleft from Scolopax rusticola L.

The specimens for both these slides were collected at Kotowice near Wrocław on 26. iii. 1957.

^{*} In brackets I give the completion of abbreviations and the explanations for the figures mentioned in the quotation.

Slide no. 42/j/16: A. icterum, 1 ♀ (deformed) from Scolopax rusticola L., Węgliniec (Wrocław District), 5. v. 1959.

Slide no. 42/k/15: A. durisetosum, 2 \(\varphi\) from Capella gallinago (L.), Verje near Medvodah, Yugoslavia, 12. ii. 1959 (specimens for this slide received from S. Brelih, Yugoslavia).

The most important item of the material of A. durisetosum used for this study is the slide determined and owned by Prof. Blagoveshchensky:

Slide no. 1479: Austromenopon (Menopon) durisetosum (Blag.), 1 3 and 1 \nabla from Capella gallinago (L.), Zap. Sib. Kraj Oz. Czany d. Now. Zaimka, 27. vii. 1936.

For the analysis of particular systematic characters carried out on the basis of the material of Mallophaga listed above I chiefly used one pair (β and φ) of A. icterum and one of A. durisetosum. The former species was represented by a male, slide no. 42/j/1-1, upon which I had based my description of the male A. icterum (ZŁOTORZYCKA, 1961, fig. 4), and a female, slide no. 42/j/2-1, of the neoholotype and neoallotypoid (phots. 1 and 2). As for A. durisetosum, I gave special attention to the male and female from slide no. 1479 (phots. 3 and 4).

The limitation of the material to these specimens seems to have been purposeful, because the same number of members of both forms should be used for a correct comparison based on numerical data, and I had only one male of A. durisetosum (slide no. 1479) at my disposal. Therefore, all the measurements and calculations presented below concern one pair of specimens of either species. In addition, I made sure that the structure of the remaining specimens of both species did not depart from the standard and that no characters described by me on the basis of the specimens chosen showed a tendency towards any major deviations or were appropriate to forms intermediate between the two species.

In the present work I deal chiefly with the proportions of the particular body parts of A. icterum and A. durisetosum, for the main dimensions of body of these species are already known (Blagoveshchensky, 1948; Złotorzycka, 1961). The basis for calculation of these proportions is text figures 1, 2, 3, and 4, showing halves of the parts of body of A. icterum examined (left) and halves of the corresponding parts of A. durisetosum (right). The outlines of these parts of body were drawn on profile paper, and the distinctive points of the outlines were projected on two perpendicular co-ordinate axes embracing each outline on two sides.

Such a graphical presentation of specimens is an original method of examining the shapes of the *Mallophaga*, used here for this purpose for the first time. Owing to its application the following simplifications are obtained:

1. Avoidance of excessive numbers of measurement lines crossing the outline of the study object, which renders it possible to keep the actual shape of the drawing clear. It is important, because not all systematic characters can be expressed in figures. It is also necessary to compare the whole and the particular parts of the object drawn visually.

2. It is easier to take measurements and check proportions on the co-ordinates than in the drawing itself.

All the drawings presented in figs. 1, 2, 3, and 4 were made to the same scale by the projection method using a ROW microscope.

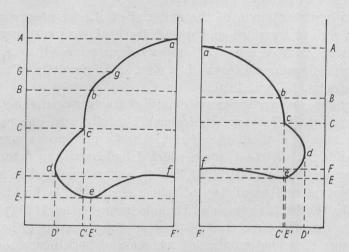


Fig. 1. Austromenopon ieterum (Burm.), 3 and Austromenopon durisetosum (Blag.), 3 (outlines of halves of heads).

Fig. 1 shows the outlines of the halves of male heads of A. icterum, slide no. 42/j/1—1, (left) and A. durisetosum, slide no. 1479, (right) cut in the midline and drawn to the same scale.

The points a) and f), lying at the intersections of the outline and the midline, are respectively the most cranial and the most caudal points of the head in the mid-line.

The letter b) denotes the point where the lateral margins of the face begin to run caudad and craniad at various angles.

The point c) indicates a rapid indentation at the entrance of the orbital sinus.

The point d) is the most laterally situated point of the parietal portion of the head.

The point e) is the most caudal point of the head. It lies on the boundary between the parietal and the occipital portion of the head.

The letter g) denotes the point of the left head outline where the facial line breaks up slightly passing into the clypeal line. No such point is marked in the outline of the head on the right, there being no bends or indentations in its facial and clypeal lines.

The projections of these points marked with small letters, on the vertical co-ordinate have been denoted by the corresponding capital letters successively from the top downwards: A, G (only for the half of head on the left-hand side), B, C, F, and E. Besides, some of the points of the head outline are projected

on to the horizontal co-ordinate, where they are accordingly denoted D', C', E', and F' to distinguish them from the symbols of the projections on the vertical axis.

The same denotation and principles are observed in fig. 2, which shows the outlines of the halves of female heads of A. icterum, slide no. 42/j/2-1, (left) and A. durisetosum, slide no. 1479, (right).

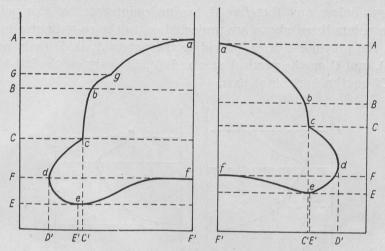


Fig. 2. Austromenopon icterum (Burm.), φ and Austromenopon durisetosum (Blag.), φ (outlines of halves of heads).

Figs. 3 and 4 present the outlines of the halves of prothoraces of both Mallophagan species drawn to the same scale as the heads in figs. 1 and 2. Moreover, the method of projecting the distinctive points of the outlines of prothoraces is analogous.

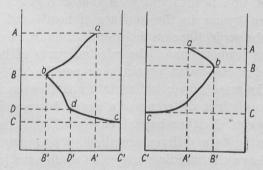


Fig. 3. Austromenopon icterum (Burm.), 3 and Austromenopon durisetosum (Blag.), 3 (outlines of halves of prothoraces).

Fig. 3 shows the outlines of the halves of male prothoraces of A. icterum (left) and A. durisetosum (right). The specimens are the same as in fig. 1.

The point a) is the most cranial point of the lateral margin of the prothorax. It lies in the place where the prothorax comes into contact with the occiput.

The point b) is the most laterally lying point of the lateral margin of the prothorax.

The point c) is the most caudal point of the prothorax in the mid-line. The point d) is marked only on the left outline and indicates a bulge in the caudal portion of the lateral margin of the prothorax. In the right part of the figure the corresponding lateral margin of the prothorax forms a semicircular line without bulges and therefore it has no counterpart of this point.

All the points listed above are projected on to the co-ordinates in the same way as in the previous figures, providing the points A, B, D (only on the left-hand side), and C on the vertical axis and B', D' (only on the left-hand side), A', and C' on the horizontal axis.

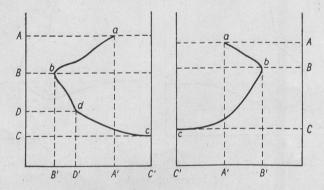


Fig. 4. Austromenopon icterum (Burm.), Q and Austromenopon durisetosum (Blag.), Q (outlines of halves of prothoraces).

Fig. 4 shows the outlines of the halves of female prothoraces of *A. icterum* (left) and *A. durisetosum* (right), drawn from the same specimens as were used for fig. 2. The denotation is identical with that in fig. 3.

The points chosen by me in the outlines of heads and prothoraces, their projecting lines and the projections on the co-ordinates are all needed to calculate the differences in the proportions of the selected parts of body of the species A. icterum and A. durisetosum as precisely as possible.

I have not put the mesothorax and metathorax to a similar analysis, since I do not notice any distinct differences in shape between the corresponding parts of the two species. Neither have I compared the shapes of abdomens, because probably owing to a different method of preservation the specimens from my collection have the middle portions of abdomens less rounded to the sides than those from the slide of Prof. Blagoveshchensky. I believe that these differences result from my using 10% KOH in preparation. It clears Mallophaga specimens but at the same time dissolves their muscles. In my preparations KOH may have been somewhat overdosed in relation to the delicate muscles of A. icterum and A. durisctosum, which caused the lateral margins to sink in. As to the preservations of the heads and thoraces of the specimens from my collection used for study, they present no danger

of distortion due to the method of preservation applied, because these parts are sufficiently stiffened by chitinous armature all over their area. Thus, whatever the method of preservation, they are fit for comparison of their shapes. Finally, I do not analyse the genitalia in detail in this paper, though it would be advisable for the sake of taxonomy. Unfortunately, the state of preservation of the particular parts of the genital organs in my specimen of A. icterum and in the specimen of A. durisetosum from the slide of Prof. Blagoveshchensky are not uniform, and so I am not able to compare them.

In the following part of my paper I offer a detailed analysis of the differences between A. icterum and A. durisetosum noticed by me. The verbal description of the differences in the shape and proportions of particular body parts between these two species is completed with numerical relations in Tables I and II made on the basis of figs. 1, 2, 3, and 4.

The head of A. icterum is more flattened than the head of A. durisetosum, this difference being less considerable in males than in females. It is reflected by the numerical relations given in Table I, items 1 and 5. Considering the differences in the head breadht: length ratio within one species, one will see from Table I, item 1 that in A. durisetosum the shape of head of the male little differs from that of the female (this difference being 0·14), whereas the head of the female of A. icterum is far more flattened than that of the male (the difference between their head breadth: length ratios equals 0·34). Thus, the degree of flattening of the head in the male of A. icterum in relation to that in the female constitutes a character of sexual dimorphism in this species. A slight difference in head flattening between the male and the female of A. durisetosum indicates the lack of an analogous character of sexual dimorphism in the last species.

The line of the lateral facial contour in both sexes of A. icterum is not so regularly rounded as in the male and female of A. durisetosum, as may be seen from figs. 1 and 2. Besides, the angles of inclination of the facial line, running craniad and caudad from the point b), to the mid-line are various in these species, that is, in A. icterum the angle below the point b) approximates to the right angle more than in A. durisetosum and that above the point b) is more acute than the corresponding angle in A. durisetosum. Lastly, the point b) is situated more cranially in A. icterum than in A. durisetosum, as is shown by the numerical relations given in Table I, item 2 and 6.

The line of the lateral occipital contour is more concave in A. icterum than in A. durisetosum, the difference being more pronounced in the males of these species than in the females (Table I, items 3 and 7).

The line of the lateral facial contour in the male of A. icterum forms a slight concavity in the place where it passes into the clypeal line, while in the female it forms a distinct indentation (figs. 1 and 2, g). The relative position of this point in the male and female is given in Table I, item 4. In A. durisetosum the facial line passes into the clypeal line imperceptibly, without any indentations. It is an important difference between these two species. The far more

distinct indentation in the female of A. icterum (fig. 2, g) in comparison with a slight indentation in the male (fig. 1, g) is another character indicating sexual dimorphism in this species and having no pendant in A. durisetosum.

The next difference between the heads of A. icterum and A. durisetosum is that in the length of maxillary palpi. The palpi of A. icterum are shorter than those of A. durisetosum, in which they obviously protrude farther beyond the head contour (Comp. phots. 1 and 2 with 3 and 4).

Finally, the overall size of head is larger in A. icterum than in A. durisetosum, the head breadth of the male of A. icterum being $1\cdot 14$ times and its length (measured along the mid-line) $1\cdot 10$ times larger than in the male of A. durisetosum. As to the females, the head of A. icterum is $1\cdot 21$ times as broad as the head of A. durisetosum and only $1\cdot 05$ times as long.

Table I Dimensional relations in the head of the species A. icterum and A. durisetosum, calculated on the basis of figs. 1 and 2

Item	Proportion	A. icterum	A. durisetosum	$A. icterum$ φ	A. durisetosum
1	2D'F': AF *	1.81	1.71	2.15	1.85
2	2C'F': BC	4.62	6.80	4.74	8.00
3	2E'F': EF	8.50	16 50	9.40	10.29
4	AF: AG	4.15	_	3.99	_
5	$\begin{array}{c} (2D'F'\colon AF) \longrightarrow (2D'F'\colon AF) \\ \text{left} & \text{right} \end{array}$	0.10		0.30	
6	(2C'F':BC) — (2C'F':BC) right left	2.18		3.26	
7	$(2E'F': EF) \longrightarrow (2E'F': EF)$ right left	8.00		0.89	

^{*} The values of all the breadth dimensions obtained from the drawings of the halves of heads (figs. 1 and 2) are multiplied by two, as I compare the whole breadths and lengths of the heads.

Further characters distinguishing A. icterum from A. durisetosum may be found in the prothorax (figs. 3 and 4).

The prothorax of the male of A. icterum is proportionally narrower than that of the male of A. durisetosum (Table II, items 1 and 5). In the females of both species the prothorax breadth: length ratios show a very slight difference, and so it may be assumed that the general proportions of prothorax are in them almost the same. Nevertheless, the prothorax of A. icterum differs considerably in appearance from that of A. durisetosum both in the male and in the female. The difference in position of the most laterally situated points of the lateral thoracic margins between the males of the two species is the most significant (Table II, item 2 and 6).

In the male of A. durisetosum the point b) is situated more cranially than it is in the male of A. icterum. In the females of both species this point is located more cranially than in the male of A. icterum. Proportionally, this difference is not so large in females as in males in both species (fig. 4).

Calculated from the numerical relations given in Table II, item 2, the difference between the male and the female of A. icterum amounts to 1.68, which indicates a different position of the point b) in either of the sexes. This, in turn, constitutes a character of sexual dimorphism within this species. As to A. duri setosum, the difference in this ratio between the male and the female being only 0.05, it cannot give evidence of sexual dimorphism.

There is a marked bend in the caudal portion of the lateral prothoracic margin of A. icterum (figs. 3 and 4, d). In A. durisetosum this bend is lacking and the lateral margin forms a gentle arch at this place. The presence of the bend, denoted by the letter d), is an apparent character distinguishing the species A. icterum from A. durisetosum. The location of the point d) in both sexes of A. icterum is defined by the numerical relations given in Table II, item 3 and 4. As will be seen from these proportions the position of the point d) in the prothorax margin varies with sexes. In the male it is located in the middle portion of the lateral margin, limited by the points b) and c), while in the female it lies more closely to the point b) (figs. 3 and 4, Table II, item 4).

Finally, I must mention the fact that the convexity of the lateral margin in the region of the point d) is more pronounced in the male than in the female. This difference, together with the difference in the position of the point d), is another character constituting the sexual dimorphism of A. icterum and having no pendant in A. durisetosum.

In A. icterum the portion of the prothorax outline ranging between the points a) and b) is a concave line, whereas in A. durisetosum the same section is slightly convex. Also the portion of the margin between the points b) and d) is concave in A. icterum and convex in A. durisetosum.

Table II Dimensional relations in the prothoraces of A. icterum and A. durise to sum, calculated on the basis of figs. 3 and 4

Item	Proportion	A. icterum	A. durisetosum	A. icterum	A. durisetosum
1	2B'C': AC	1.73	2.08	2.05	2.06
2	2B'C' : AB	3.75	6.75	5.43	6.80
3	AC: DC	6.80	_	4.33	_
4	D'C'-: BD	1 40	_	2.00	
5	(2B'C':AC) — $(2B'C':AC)$ right left	0.35		0.01	
6	2B'C':AB) — $(2B'C':AB)$ right left	3.00		1.37	

In addition, the prothorax of A. icterum, like its head, is larger than the prothorax of A. durisetosum. Its breadth and length (measured along the midline) in the male of A. icterum are respectively $1\cdot11$ and $1\cdot35$ times as large as the corresponding dimensions in the male of A. durisetosum (fig. 3). In the females these figures are respectively $1\cdot12$ and $1\cdot15$.

It remains to discuss the differences in the structure of the genital organs of *A. icterum* and *A. durisetosum*. Figures 5 and 6 are to the same scale and have been made by the same method as the previous drawings. It ought to be men-

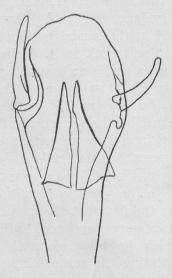


Fig. 5. Austromenopon icterum (Burm.), 3 (genitalia).

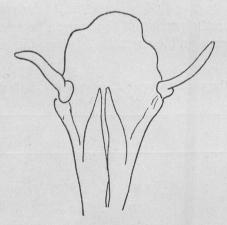


Fig. 6. Austromenopon durisetosum (Blag.), 3 (genitalia).

tioned that the genital organ of the male of A. ieterum has been drawn from slide no. 42/j/1—2, because in the male, slide no. 42/j/1—1, which was used for description, the genitalia are not well visible.

Although the genital organs in the species in question are alike, they show some differences. I do not include dimensions in this description, because in the total preparations it is difficult to perceive the whole of the organ and, in addition, the parameres in the specimens examined were bent a little in the vertical plane, which made it difficult to measure their length precisely.

At any rate, the parameres are longer in A. icterum than in A. durisetosum and, besides, they are slightly sharpened at the base in the former species and globularly swollen at this place in the latter. The sclerites of the genital sac in A. icterum are narrower than in A. durisetosum, and their outer margins are concave, while in A. durisetosum they are convex.

As may be inferred from the foregoing considerations, based for the most part on the calculations of the numerical relations between the selected sections of body of A. icterum and A. durisetosum, as well as their comparison, both these species show a number of differences in their external structure, which render the faultless distinction between them possible. Part of these differences can be easily noticed at a direct comparison of the shape of particular specimens, e. g., the indentations, convexities, and concavities of the lateral margins of the body parts. However, most of the differences can be established to a certainty and determined as strictly as possible only by the use of suitable combinations of the quantitative relations characterizing the corresponding parts of body.

Moreover, I found out several characters in A. icterum which bear evidence of its distinct sexual dimorphism, but I failed to find such characters in A. durisetosum. I think it is important, because the ascertainment of sexual dimorphism only in A. icterum proves that this species does not stand so closely to A. durisetosum as it has been thought hitherto, but that in spite of appearances the two species are rather distant systematically. The establishment of the precise position of the species A. icterum and A. durisetosum in the rank of the known species of the genus Austromenopon Bedf. will probably be achieved after carrying out close numerical analyses, with special attention paid to mutual dimensional relations, and determining the presence or absence of apparent characters constituting sexual dimorphism in particular species.

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Praca dotyczy dwóch gatunków Mallophaga: Austromenopon icterum (Burmeister, 1838) i Austromenopon durisetosum (Blagoveshchensky, 1848). Gatunki te były dotychczas słabo poznane pod względem taksonomicznym i dlatego celem tej pracy jest uzupełnienie wiadomości dotyczących niektórych cech charakteryzujących i odróżniających oba gatunki.

W niniejszej pracy dzięki zastosowaniu porównywań proporcji poszczególnych części ciała u obu gatunków, wzbogaconych przez autorkę nowymi metodami graficznymi polegającymi na operowaniu rzutami określonych punktów ciała na dwie prostopadłe osie współrzędnych, przeprowadzono szczegółową analizę porównawczą głowy i przedtułowia u obu wyżej wspomnianych gatunków. Wykazano w ten sposób szereg nowych, dotąd nie opisywanych cech odróżniających gatunek A. icterum od A. durisetosum, oraz wykryto wyraźne cechy dymorfizmu płeiowego u A. icterum, podczas gdy na podstawie analizy analogicznych części ciała nie można stwierdzić dymorfizmu płeiowego u gatunku A. durisetosum. Odkrycie to, według autorki, stawia oba gatunki w nieco odmiennym świetle niż to miało miejsce dotychczas, ponieważ wyżej wymienione różnice wskazują, że nie należy uważać gatunków A. icterum i A. durisetosum za bardzo blisko stojące obok siebie pod względem systematycznym.

РЕЗЮМЕ

Работа охватывает два вида Mallophaga: Austromenopon icterum (Burmeister, 1838) и Austromenopon durisetosum (Blagoveshchensky, 1948). Виды эти в таксономическом отношении были до сих пор слабо изучены, поэтому целью рабогы является дополнение сведений, касающихся некоторых черт характеризующих и отличающих эти виды друг от друга.

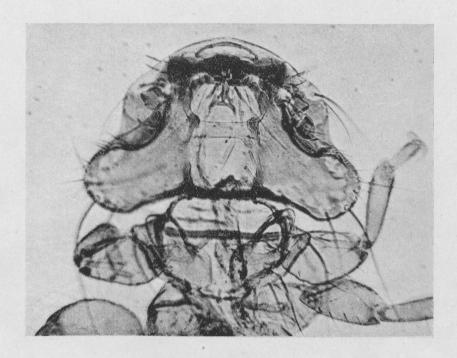
В настоящей работе — благодаря сравнению пропорций отдельных частей тела обоих видов, обогащенных автором новыми графическими методами, заключающимися в проектировании отдельных точек тела на две перпендикулярные оси координат — проделан точный сравнительный анализ головы и предплеча у обоих вышеупомянутых видов. Обнаружено таким образом ряд новых, не описанных до сих пор черт, отличающих вид $A.\ icterum$ от $A.\ durisetosum$, а также обнаружены свойства очень ярко выраженного полового диморфизма у $A.\ icterum$, тогда как на основании анализа сопоставления аналогичных частей тела невозможно обнаружить половой дифорфизм у вида $A.\ durisetosum$. Это открытие, по мнению автора ставит оба вида в совершенно другом свете, так как вышеупомянутые отличия указывают на то, что виды $A.\ icterum$ и $A.\ durisetosum$ не стоят рядом ни в систематическом ни в филогенетическом отношении.



Plate XX

Fig. 1. Austromenopon icterum (BURM.), 3 (head and prothorax).

Fig. 2. Austromenopon durisetosum (Blag.), 3 (head and prothorax).



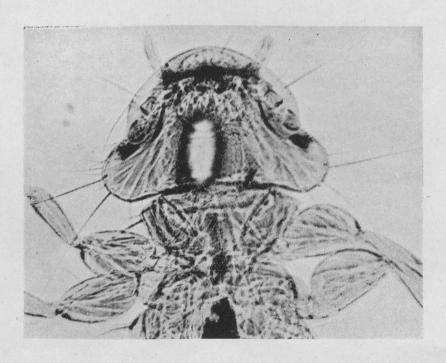
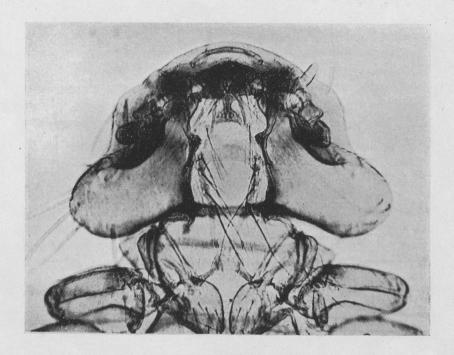
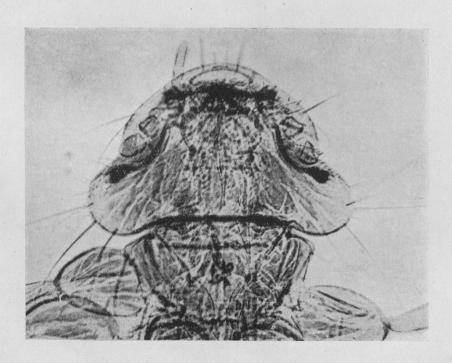


Plate XXI

Fig. 3. Austromenopon icterum (Burm.), φ (head and prothorax). Fig. 4. Austromenopon durisetosum (Blag.), φ (head and prothorax).





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