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and its geographic distribution**

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ANCYROCEPHALUS (S.L.) VANBENEDENII (PAR. ET. PER.)
(MONOGENOIDEA) AND ITS GEOGRAPHIC DISTRIBUTION

by

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Edited

by

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Translated

by

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TRANSLATION SERIES 11

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Preface
to Translation¹

Translation of this paper was undertaken as part of a long-term research project on the systematics, host-specificity and zoogeography of monogenetic trematodes.² Translation and editing were accomplished in the following manner:

1. Oustinoff³ read translation on tape.
2. Mrs. Morales transcribed translation from tape to first typescript.
3. Hargis edited typescript.
4. Typescript retyped by Mrs. Morales
5. Hargis again edited typescript for final corrections.

A conscious effort has been made to keep this translation as near the original as possible. It is probably inevitable, however, that some of the nuances of meaning in the original have been distorted or lost. For this we apologize to the author and reader.

Certain passages were difficult to translate. Where a different English phrase seems to fit the author's meaning better or serves to clarify the text, it has been inserted in brackets. Certain obvious errors or misspellings in the original text were changed, less obvious ones are noted with (sic).

For convenience in referring to the Russian text the original pagination is given in the margin of the translation opposite the place where the new page begins. Occasionally figures or tables are somewhat displaced from their original page location; however, since they, themselves, are numbered sequentially, no confusion should result.

This translation is intended as a service to researchers. Though effort has been made to make it comprehensible, accurate and useful, it is likely that improvements can be made. Should literary improvements or verification appear desirable it is suggested that the researcher make his own translation. Pagination is arranged to facilitate such activity. We will appreciate constructive suggestions for improvements in this and future translations.

Thanks are due to Mrs. Patricia C. Morales of the Virginia Institute of Marine Science who transcribed, typed and assembled the manuscript, and to Miss Evelyn Wells who assisted with final editing.

William J. Hargis, Jr.

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ANCYROCEPHALUS (S.L.) VANBENEDENII (PAR. ET PER.)

(MONOGENOIDEA) AND ITS GEOGRAPHIC DISTRIBUTION

When B. E. Bychowsky examined the gills of Mugil cephalus (L.) p291 from the Tumen'-Ula River from the Far East (collected in 1911) he found monogenetic trematodes belonging to the genus Ancyrocephalus s.l. A detailed study of these forms and comparison of their characteristics with those of typical A. vanbenedenii (Parona et Perugia) from Mugil auratus Risso and M. ramada Risso from the Black Sea collected by B. E. Bychowsky indicated that the populations from all three hosts were conspecific. Certain differences in the dimensions (as well as in the shape) of morphological elements can be explained by the extreme variability and overlap among the parasites /populations/ from each of the three above-mentioned fishes, which is graphically illustrated in the table (on the following page).

In his work of 1871, van Beneden cites a worm under the name of Gyrodactyle as a parasite on Mugil chelo Cuv. (= M. labrosus R.). van Beneden did not give a description of the worm and, although the drawing which was given therein is not accurate, it permits us to distinguish two pairs of middle hooks /anchors/ in this /so-called/ Gyrodactyle. Because only one species of Monogenoidea with two pairs of anchors was encountered on the Mugil species of Europe, Parona and Perugia (1890) quite logically considered their Tetraonchus vanbenedenii as Gyrodactyle of van Beneden.

Because the above-mentioned authors present a very short and inaccurate description of this species and there is no more complete description of this species in the subsequent literature it is important to fill this gap.

Ancyrocephalus (s.l.) vanbenedenii (Parona and Perugia, 1890)
Johnston and Tiegs, 1922 (see drawing)

Synonyms: Gyrodactyle van Beneden, 1870; Tetraonchus Van Benedenii Parona and Perugia, 1890, 1892; Dactylogyrus vanbenedenii Parona and Perugia, 1895; Tetraonchus benedeni and T. vanbenedenii St. Remy, 1898.

Rather large worms, 0.4 - 0.66 mm long and 0.08 - 0.16 wide. The pharynx is rounded or somewhat elongated, 0.029 - 0.043 long and 0.029 - 0.032 wide. The attaching disc /posthaptor/ is short and wide, but narrower than the greatest width of the body; its length is 0.04 - 0.064, its width 0.08 - 0.136. The attaching apparatus consists of 7 pairs of marginal hooks, two pairs of middle hooks /anchors/ and 2 plates /haptoral bars/. The marginal hooks are small, with thin straight handles without widenings and finger-shaped "heels"; their overall length is 0.011 - 0.013 and the length of the handle is 0.007 - 0.009. The anchors are paired: the anchors of one pair--dorsal--are oriented with their points toward the dorsal side, the other pair--ventral--are oriented with their points toward the ventral side. The shape of the anchors of both pairs is similar; they have well-developed outgrowths /roots/, but the dorsal anchors have smooth edges, whereas in the ventral ones the interior surface of the interior outgrowths /deep roots/ (and sometimes also of the outgrowths /superficial roots/) is wavy, in the majority of the cases with two swellings. The points of the dorsal anchors are usually shorter than the points of the ventral anchors, and the basal parts of the dorsal anchors is somewhat larger than that of the ventral ones. The comparative lengths of both anchor pairs vary; most often the ventral ones are somewhat longer than the dorsal, but there are cases when they are of the same length and conversely--when the dorsal ones are larger than the ventral; the same can be said also about the basal part, only the comparative situation is reversed--more often in the dorsal anchors the basal part is larger than in the ventral ones, but the extreme dimensions of the overall lengths of the anchors of both pairs are almost the same. The range of dimensions of separate elements of the chitinous armature and also the average lengths of measurements of the anchors can be seen in the table. p293

The dorsal connecting plate /dorsal haptoral bar/ is a simple chitinous piece; some are somewhat thickened in the middle and at the ends, others are almost straight or somewhat V-shaped. The ventral connecting plate /ventral haptoral bar/ is shaped like an inverted T, almost straight with noticeably sinuous edges; its anterior protuberance is either shaped like a two-horned piece (mainly among the Black Sea forms) or like a trefoil (more often among Far Eastern forms).

The copulatory organ consists of a tube /cirrus/ and a supporting apparatus /accessory piece/. The cirrus is thin, somewhat widened at its origin and gradually narrowing toward the end, it is markedly curved like a flattened deformed spiral, making 1 to 1.5 revolutions, the basal part is inflated like a bladder, with more or less noticeable lobe-shaped chitinous crests; the diameter at the proximal portion is approximately 0.003 and of the distal is 0.0005. The accessory piece is shaped like a flat ribbon divided in its distal third; in a majority of cases it is not possible to see its connection with the basal part of the cirrus. p294

The female sex system has a small chitinous /sclerotized/ vaginal duct¹, narrowed proximally and gradually widening distally; its length is

¹It was not possible to distinguish it on dense preparations from M. cephalus.

0.02 - 0.028, its diameter at the distal end is approximately 0.0015.

Hosts: 1) Mugil labrosus Risso, 2) M. auratus Risso, 3) M. ramada Risso and 4) M. cephalus L.

Habitat: Gill filaments.

Localities: North Sea (first host), Mediterranean (second), Black Sea (second and third) and Tumen'-Ula River (fourth).

The occurrence of the same species of Ancyrocephalus (s.l.) in places located in different hemispheres, which differ both in the conditions of the medium /macroenvironment/ and in evolutionary history and which are separated on one hand by the seas of the Arctic zone and on the other by the seas of the Tropic zone, is of considerable interest. The morphology of this parasite in the North, Mediterranean and Japan seas is almost identical, and the hosts belong to closely related species of one genus. This permits us to assign A. vanbenedenii to the number of parasites specific for marine representatives of the genus Mugil.

Its occurrence in the basin of the Sea of Japan testifies to the fact that in the fauna of the parasites of the latter, together with the migrants from the Barents Sea through the Bering Straits (Bychowsky and Poljansky, 1953) and the autochthonic forms such as Dactylogyrus ivanowi Bych., there are representatives of the Mediterranean fauna, which apparently came here through the Indian Ocean, and others.

The occurrence of A. vanbenedenii on four closely related species of fishes is, as was already noted by B. E. Bychowsky (1949), the result of the more retarded tempo of evolution of many parasites in comparison with that of their hosts. However, the occurrence of another very close species-- A. (s.l.) fluviatilis (Bychowsky, 1949) on the gills of freshwater Persian Mugil abu zarudnyi supports the hypothesis that the transfer of the ancestors of Mugil abu zarudnyi into fresh waters exerted a greater influence on the parasites than the /effect of the migration/ of Mugil cephalus into another hemisphere. Thus, in the case of A. fluviatilis we have a good example of coincidence of the rate of evolution of the parasites with the rate of evolution of the hosts, and the reason for this can be seen in the sharper change of conditions of the external environment experienced in the transfer from the sea to the constant habitat presented by fresh water.

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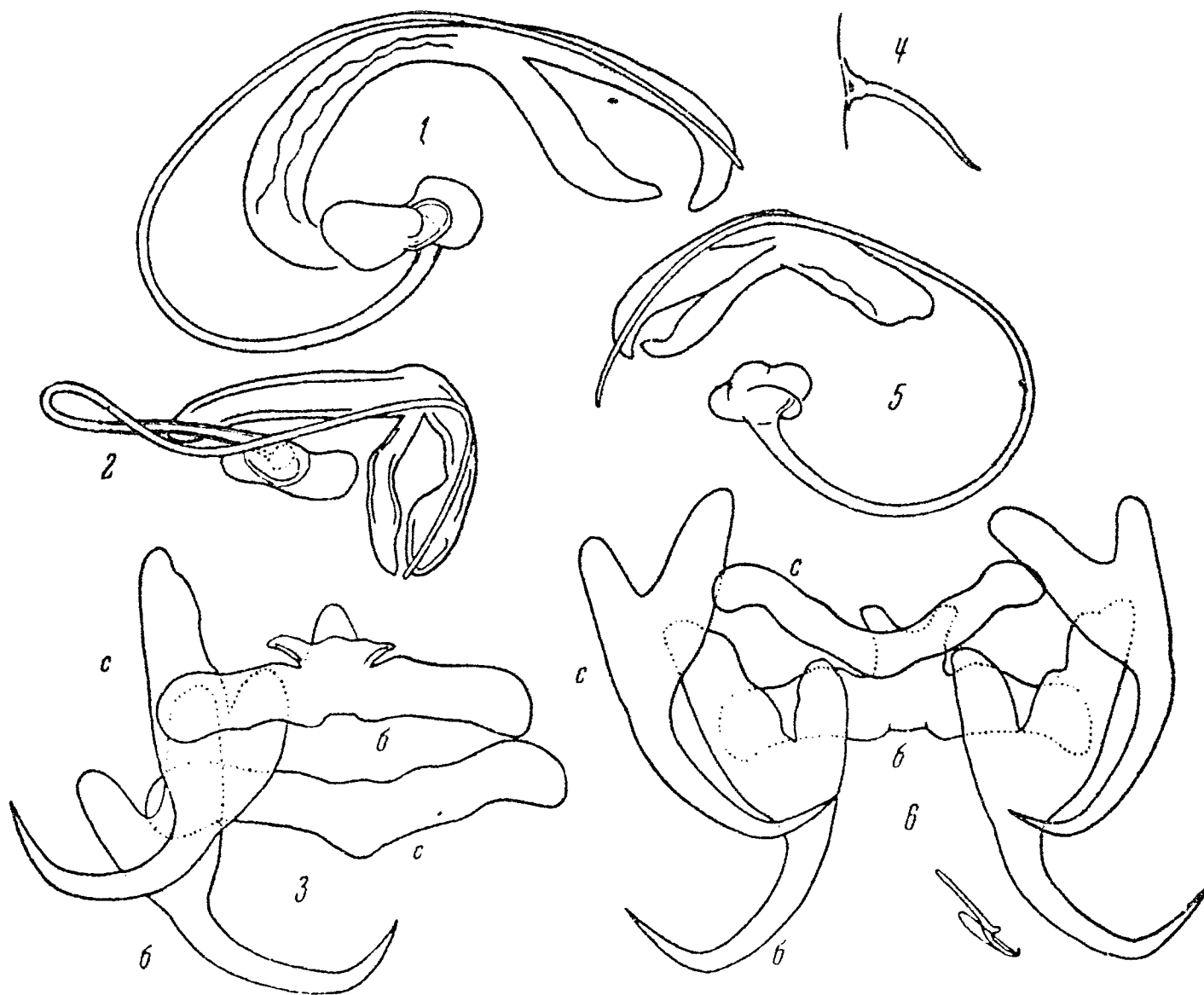
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Variations in the dimensions of chitinous formations
of Ancyrocephalus (s.l.) vanbenedenii

| Chitinous formations of <u>Ancyrocephalus</u> (s.l.) <u>vanbenedenii</u> | from <u>Mugil auratus</u> | | | from <u>Mugil ramada</u> | | | from <u>Mugil cephalus</u> | | | Aggregate data | | |
|--|---------------------------|---------|---------|--------------------------|---------|---------|----------------------------|---------|---------|----------------|---------|---------|
| | Minimum | Maximum | Average | Minimum | Maximum | Average | Minimum | Maximum | Average | Minimum | Maximum | Average |
| Ventral pair of anchors: | | | | | | | | | | | | |
| Overall length | 0.027 | 0.035 | 0.030 | 0.035 | 0.039 | 0.037 | 0.037 | 0.041 | 0.039 | 0.027 | 0.041 | 0.0355 |
| " of basal part | 0.023 | 0.027 | 0.024 | 0.026 | 0.027 | 0.0267 | 0.023 | 0.028 | 0.0257 | 0.023 | 0.029 | 0.0254 |
| " of superficial root | 0.007 | 0.009 | 0.0078 | 0.009 | 0.015 | 0.0113 | 0.006 | 0.010 | 0.0082 | 0.006 | 0.015 | 0.0091 |
| " of deep root | 0.010 | 0.012 | 0.0102 | 0.015 | 0.019 | 0.0167 | 0.017 | 0.019 | 0.018 | 0.010 | 0.019 | 0.0147 |
| " of the point | 0.008 | 0.015 | 0.0098 | 0.010 | 0.012 | 0.0107 | 0.010 | 0.011 | 0.0102 | 0.008 | 0.015 | 0.0102 |
| Dorsal pair of anchors: | | | | | | | | | | | | |
| Overall length | 0.029 | 0.034 | 0.031 | 0.036 | 0.039 | 0.037 | 0.037 | 0.041 | 0.039 | 0.029 | 0.041 | 0.035 |
| " of basal part | 0.021 | 0.031 | 0.022 | 0.025 | 0.029 | 0.028 | 0.027 | 0.031 | 0.029 | 0.021 | 0.030 | 0.0263 |
| " of superficial root | 0.004 | 0.006 | 0.0046 | 0.008 | 0.010 | 0.0085 | 0.006 | 0.010 | 0.0078 | 0.004 | 0.010 | 0.007 |
| " of deep root | 0.007 | 0.010 | 0.0088 | 0.010 | 0.016 | 0.0131 | 0.015 | 0.019 | 0.0156 | 0.007 | 0.016 | 0.0125 |
| " of the point | 0.008 | 0.011 | 0.0095 | 0.008 | 0.009 | 0.0083 | 0.010 | 0.011 | 0.0102 | 0.008 | 0.011 | 0.009 |
| Ventral haptoral bar: | | | | | | | | | | | | |
| length | 0.010 | 0.012 | 0.011 | 0.012 | 0.016 | 0.014 | 0.012 | 0.014 | 0.013 | 0.010 | 0.016 | 0.0127 |
| width | 0.038 | 0.039 | 0.0385 | 0.039 | 0.045 | 0.042 | 0.039 | 0.045 | 0.042 | 0.038 | 0.045 | 0.0408 |
| Dorsal haptoral bar: | | | | | | | | | | | | |
| length | 0.006 | 0.008 | 0.007 | 0.006 | 0.006 | 0.006 | 0.004 | 0.009 | 0.007 | 0.004 | 0.009 | 0.0061 |
| width | 0.034 | 0.043 | 0.0385 | 0.035 | 0.041 | 0.038 | 0.039 | 0.049 | 0.043 | 0.034 | 0.049 | 0.0398 |
| Length of Cirrus | 0.009—0.011 | | | 0.100—0.115 | | | 0.105—0.137 | | | 0.090—0.137 | | |
| Length of Accessory piece | 0.030 | | | 0.04 | | | 0.055—0.070 | | | 0.030—0.070 | | |

FIGS. 1 - 3. Variants of the cirrus, anchors, and haptoral bar (b - ventral, s - dorsal) of specimens from Mugil cephalus of the Tumen'-Ula.

FIGS. 4 - 6. Vaginal ducts, cirrus, anchors, marginal hooks and haptoral bars of a specimen from Mugil ramada of the Black Sea.



Ancyrocephalus (s.l.) *vanbenedenii*

1—3 варианты копулятивного органа, срединные крючья и соединительные пластинки (б — брюшные, с — спинные) экземпляров с *Mugil cephalus* из Тумень-Ула; 4—6' — вагинальная трубка, копулятивный орган, срединные крючья, краевой крючок и соединительные пластинки экземпляра с *Mugil gamada* из Черного моря