

## 7. The Structure and Systematic Position of *Polykrikos* Bütsch.

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(With 1 figure.)

eingeg. 28. November 1906.

The infusorian described by Ouljanin (1868)<sup>1</sup> as a Turbellarian larva, by Bütschli (1873)<sup>2</sup> as the infusorian *Polykrikos*, and again by Bergh (1881)<sup>3</sup> as one of the so-called Cilioflagellates, has presented certain structural peculiarities which have isolated it, rendered its position in classification uncertain and obscured its relationships. Bütschli in his »Tierreich« monograph places it in the family *Polydinida* of the suborder *Dinifera* of the *Dinoflagellata*. Calkins raises the group *Polydinida* to the ordinal rank coordinate with the *Diniferida*. Schütt in his Plankton-Expedition Report makes no mention of it and omits the genus entirely from his »*Peridinales*« of the »Pflanzenfamilien« of Engler and Prantl.

An abundance of material, apparently of the European species, has enabled me to make a reëxamination of the animal at the San Diego Station where it occurred in large numbers in the neritic surface plankton during the past summer.

Instead of having only a single longitudinal flagellum, with possibly a secondary accessory one (*P. schwartzi* Bütschli) for the 4—8 transverse ones as hitherto described, there is always present a longitudinal flagellum for every transverse one. The slightly oblique longitudinal furrow is in reality a series of furrows joined end to end and the animal is accordingly a colony of four or eight individuals en chaîne, each with its transverse and longitudinal furrow and their corresponding flagella. These flagella, as in some other *Dinoflagellata*, have their origin in separate pores placed near each other, that of the transverse flagellum being at the junction of the longitudinal and transverse furrows and that of the longitudinal flagellum lying in the longitudinal furrow a short distance behind the other pore. The two flagella present the characteristic differences seen in other *Dinoflagellata*. The transverse one in life exhibits intermittent spiral motion progressing distally on the lash, and when not in motion retains its spiral form. In preserved material (formalin) it is sinuous with ragged margins. The longitudinal flagella on the other hand exhibit wave-like undulations of wider amplitude which

<sup>1</sup> Ouljanin, Protokolle d. K. Gesellsch. d. Freunde d. Naturwiss. zu Moskau. 1868. S. 61, fide Leuckarts Jahresb. 1868—1869. S. 123.

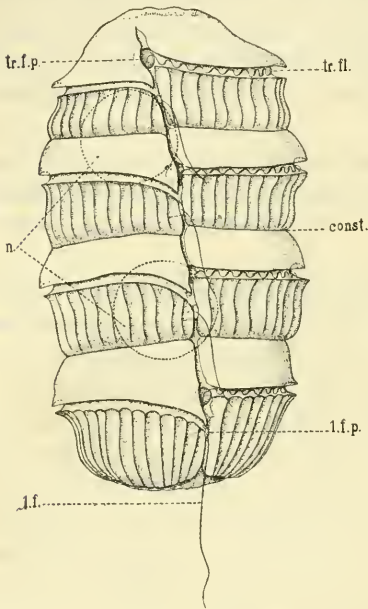
<sup>2</sup> Bütschli, O., Einiges über Infusorien. Arch. f. mikr. Anat. Bd. 9. S. 657—678, Taf. 27.

<sup>3</sup> Bergh, R. S., Der Organismus der Cilioflagellaten. Morph. Jahrb. Bd. 7. S. 177—288, Taf. 12—16.

progress posteriorly and are less evidently spiral in form. In preserved material they are often nearly straight, or more or less curved, with smooth edges.

The four or eight transverse flagella are equal in length and reach approximately to the mid-dorsal line when in action. The longitudinal flagella are not equal, the hindmost being somewhat longer than any one of the other three or seven, which are about equal to each other in length. In action the hindmost flagellum projects posteriorly parallel to the long axis of the body and functions as a propelling-steering organ. The other three flagella are not confined to their respective furrows but project out

from the body at a slight angle. They are visible only in certain positions of the organisms and are seen best in side view as the animal rotates. The most favorable conditions of illumination are necessary to demonstrate their presence. I was not always able to find them, largely, it seems, because the organism is exceedingly sensitive and speedily succumbs to the electro-chemical stimuli resulting from the use of a water immersion lens, or to the effects of the brilliant illumination necessary for microscopic examination. Persistent search demonstrated their presence so frequently that I believe they are normal structures generally present.



*Polykrikos schwartzi* Bütsch. Ventral view, showing surface markings, flagella, and flagellar pores in a somewhat contracted individual. From life. X. 300. *Const.*, interzooidal constriction; *l. f.*, longitudinal flagellum; *l. f. p.*, pore of longitudinal furrow; *n.*, nuclei; *tr. fl.*, transverse flagellum; *tr. f. p.*, pore of transverse flagellum.

If this be the case, *Polykrikos* is unquestionably a Dinoflagellate, and moreover, not a peculiar organism demanding a separate order for its reception. It is rather one of the Gymnodinidae, as Bergh suggested, worthy of generic distinction because of the peculiar netting organs which it possesses but hardly requiring further isolation unless the Gymnodinidae should be broken up into subfamilies.

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other genera. Within the Gymnodinidae occurs the most persistent type, in the case of *Spirodinium geminatum* where the species occurs, as a rule, and perhaps always, in short chains of two or four individuals, each with its complement of furrows, flagella and nucleus.

In *Polykrikos*, however, the colonial organization is permanent, and, moreover, the individual organization of the separate zooids is modified to the extent that nuclear division does not always occur coincidentally with the multiplication of superficial structures such as furrows, flagella and the inter-zooidal constrictions. Nuclear division thus lags behind, and suspends the completion of the zooid formation until the next following division of superficial structures is impending.

The presence of the normal complement of two flagella for each zooid of *Polykrikos* not only demonstrates its close relationship to *Gymnodinium* but it also removes the most important distinction on which *Polykrikos auricularia* Bergh (1881) was founded. It seems probable that this species is in reality identical with *P. schwartzi* Bütschli and must accordingly be reduced to a synonym. My examination of many individuals shows that the other distinctions upon which Bergh founded his *P. auricularia* break down as species characters. A full discussion of the organism will be found in a final paper to appear shortly.

We may therefore conclude that *Polykrikos* is a colonial organism of 2, 4, or rarely 8 zooids and belongs in the family Gymnodinidae. Its place in the system may be indicated as follows:

Subclass *Dinoflagellata*.

Family **Gymnodinidae**.

Sub-family Polydininae.

Gymnodinidae with colonial organization. Nettling organs present. Represented by a single genus and species *Polykrikos auricularia* Bütschli. In neritic plankton on coasts of Europe and California.

Berkeley, California, Nov. 10, 1906.

## 8. Experimente mit Riesenschlangen zur Feststellung ihres Nahrungsquantums.

Von Dr. Alexander Sokolowsky, zoologischer Assistent am Tierpark Hagenbeck.

(Mit 1 Figur.)

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Um die Größe der Freßlust der Riesenschlangen zu bestimmen, wurden seit vorigem Winter bis auf den heutigen Tag im Hagenbeck'schen Tierpark in Stellingen wiederholt Experimente ausgeführt, über deren Resultate ich im folgenden kurz berichten will:

Während früher angenommen wurde, daß die Riesenschlangen nur

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