

# THE ORIENTATION OF THE SACCOLINIDAE (CRUSTACEA RHIZOCEPHALA) IN RESPECT TO THEIR HOSTS

by

H. BOSCHMA

---

Delage (1884) and Smith (1906), two authors who published extremely important contributions on Rhizocephala, largely differed in their views concerning the morphology of these parasites. Both regarded the surface of the parasites touching the thorax of the host as the left side, but in other respects they were of a quite different opinion.

Delage's (1884) ideas on the morphology of *Sacculina* were, as he stated himself, different from those of previous authors. In his opinion the dorsal region of the parasite is on the left side of the host, the ventral region on the right side of the host. The left side of the parasite touches the sternum of the crab, the right side the abdomen. As a matter of fact then the region of the stalk must be regarded as the anterior (in Delage's terminology "superior") part of the parasite, the region of the mantle opening as the posterior (in Delage's terminology "inferior") part. According to Delage's views consequently the mesentery is found in the ventral region of the parasite.

The manner of orientation of *Sacculina* as proposed by Smith (1906) was largely based on comparison of the morphology with that of *Pelto-gaster*. According to Smith the mesentery determines the dorsal region. The region of the stalk is the posterior part of the parasite, the region of the mantle opening the anterior part. Consequently the surface of the parasite which is in contact with the thorax of the crab is the left side, the surface which is lying against the abdomen is the right side.

In previous papers dealing with Sacculinidae I have followed Smith in distinguishing right and left side, dorsal and ventral region, anterior and posterior extremity of the parasites in exactly the same manner. In the description of the macroscopical external characters of the parasites I usually employed the terms "the surface turned towards the thorax of the

crab" and "the surface touching the abdomen of the host" or the terms "thoracal surface" and "abdominal surface" to indicate the left and right side.

In his review of the various terms used to indicate the different parts of the Sacculinidae Krüger (1940) accepts the orientation as proposed by Smith. He consequently states that the mantle opening is found in the anterior region, the stalk in the posterior region, and the mesentery in the dorsal region. Krüger further establishes the fact that the longitudinal axis (the axis running through the mantle opening and the stalk) is the morphological length, the transverse axis is the morphological breadth, and the dorsoventral axis is the morphological thickness. It was useful to emphasize this as I myself repeatedly had used the terms "height", "breadth", and "thickness" in a quite different sense. For convenience' sake in the description of the external form of the parasites I generally used the word "breadth" for the dorso-ventral diameter, the word "height" for the antero-posterior diameter, and the word "thickness" for the lesser diameter, viz., the distance between the right and the left surface. To use these words in their correct morphological interpretation the term "breadth" ought to be replaced by "thickness", the term "height" by "length", and the term "thickness" by "breadth". The use of the words in a sense differing from their morphological significance might easily lead to confusion.

*Loxothylacus* differs from *Sacculina* in two important characters: the male genital organs have a pronouncedly curved shape, and the visceral mass is attached to the mantle at some distance from the stalk. This last character may be defined more precisely in the following manner: the visceral mass is attached to the mantle to the right of the stalk. For the rest the morphology of *Loxothylacus* exactly corresponds with that of *Sacculina*, so that also in this genus the surface regarding the thorax of the host invariably is the left side.

As in *Loxothylacus* the place of attachment of the visceral mass to the mantle has shifted to the right side (as compared with the other genera of Sacculinidae) its internal anatomy is rather pronouncedly asymmetrical. To ascertain whether this asymmetry also influences its effect on the male genital organs the particulars concerning the size of these organs in each specimen of the genus of which there exists a figure of a section showing the male organs were noted. This resulted in the following data.

*Loxothylacus corculum* (Kossm.): approximately equal size (Van Kampen & Boschma, 1925, Pl. II fig. 3).

*Loxothylacus panopaei* (Gissl.): right larger than left (Boschma, 1928

a, fig. 5; the organ indicated in this figure as "left testis" in reality is the right; 1931 a, fig. 48).

*Loxothylacus spinulosus*: left larger than right (Boschma, 1928 b, fig. 9; 1933, fig. 52).

*Loxothylacus carinatus* (Kossm.): right larger than left (Boschma, 1931 a, fig. 50) or approximately equal size (Boschma, 1931 b, fig. 38).

*Loxothylacus desmothrix*: approximately equal size (Boschma, 1931 a, fig. 52; 1936, fig. 9) or left larger than right (Boschma, 1931 b, fig. 41; 1936, fig. 12).

*Loxothylacus aristatus*: approximately equal size (Boschma, 1931 b, fig. 39; 1936, fig. 2).

*Loxothylacus setaceus*: right larger than left (Boschma, 1931 b, fig. 40; 1936, fig. 5).

*Loxothylacus strandi*: approximately equal size (Boschma, 1933, fig. 50; 1936, fig. 14).

*Loxothylacus nierstraszi*: approximately equal size (Boschma, 1938, fig. 2).

*Loxothylacus variabilis*: right larger than left (Boschma, 1940, figs. 6, 10, 11, 15, and 19) or approximately equal size (l. c., figs. 1, 8, and 22).

*Loxothylacus echioides*: left larger than right (Boschma, 1940, fig. 26).

*Loxothylacus torridus*: right larger than left (Boschma, 1940, figs. 33 and 36) or approximately equal size (l. c., figs. 30 and 38).

*Loxothylacus musivus*: approximately equal size (Boschma, 1940, figs. 41 and 45).

*Loxothylacus brachythrix*: left larger than right (Boschma, 1940, fig. 54) or right larger than left (l. c., fig. 56) or approximately equal size (l. c., figs. 48 and 51).

*Loxothylacus amoenus*: approximately equal size (Boschma, 1940, fig. 59).

*Loxothylacus sclerothrix*: approximately equal size (Boschma, 1940, fig. 62).

*Loxothylacus vepretus*: right larger than left (Boschma, 1947, figs. 1, 2, 3, and 4).

The data given above refer to 36 specimens (of some of these two figures were published in separate papers). In 16 specimens the two testes are of approximately equal size, in 16 other specimens the right testis is appreciably larger than the left, and in 4 specimens the left testis is larger than the right. Although there seems to be a tendency for a stronger development of the right testis this is by no means a general rule.

## LITERATURE

- BOSCHMA, H., 1928 *a*. Two common Species of parasitic Crustacea (Sacculinidae) of the West Indies. Proc. U.S. Nat. Mus., vol. 73.
- , 1928 *b*. The Rhizocephala of the Leiden Museum. Zool. Meded., vol. 11.
- , 1931 *a*. Rhizocephala. Papers from Dr. Th. Mortensen's Pacific Expedition 1914-16. Vidensk. Medd. Dansk naturh. Foren., vol. 89.
- , 1931 *b*. Die Rhizocephalen der Siboga-Expedition. Supplement. Siboga-Expeditie, monogr. 31 bis.
- , 1933. The Rhizocephala in the Collection of the British Museum. Journ. Linn. Soc. London, Zool., vol. 38.
- , 1936. Notes on some Rhizocephala of the genus *Loxothylacus*. Festschrift Professor Dr. Embrik Strand, vol. 1.
- , 1938. *Loxothylacus nierstraszi*, a new Species of Rhizocephalan Parasite from the East Indies. Arch. néerl. Zool., vol. 3, suppl.
- , 1940. Some Rhizocephala of the Genus *Loxothylacus*. Biol. Res. Snellius Exp. 8. Temminckia, vol. 5.
- , 1947. The Rhizocephalan Parasites of the Crab *Chlorodiella nigra* (Forsk.). Proc. Kon. Ned. Akad. Wetensch. Amsterdam, vol. 50.
- DELAGE, Y., 1884. Evolution de la Sacculine (*Sacculina carcini* Thomps.) crustacé endoparasite de l'ordre nouveau des Kentrogonides. Arch. Zool. exp. gén. (2), vol. 2.
- KAMPEN, P. N. VAN & H. BOSCHMA, 1925. Die Rhizocephalen der Siboga-Expedition. Siboga-Expeditie, monogr. 31 bis.
- KRÜGER, P., 1940. Ascothoracida, Cirripedia. Bronn's Kl. u. Ordn. des Tierreichs, vol. 5, pt. 1, 3.
- SMITH, G., 1906. Rhizocephala. Fauna und Flora des Golfes von Neapel, monogr. 29.
-