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On the Sinus Glands in Four Species Belonging to the Idoteidae (Crustacea, Isopoda)^{1) 2)}

By

Chitaru Oguro

(Akkeshi Marine Biological Station)

(With 1 Text-figure and 1 Plate)

In the previous paper (Oguro, 1959 a), the present writer reported the occurrence of accessory sinus gland besides the ordinary one in the isopod, *Idotea japonica*. After that, he had an opportunity of examining the neurosecretory system of three idoteid isopods, *Idotea ochotensis*, *Cleantiella isopus* and *Mesidotea* sp., and found that these isopods are also furnished with the two pairs of sinus gland. In this paper, some observations on the sinus glands of these animals will be described, in comparison with the sinus glands of *I. japonica*.

Before going further, the writer wishes to express his sincere thanks to Professor Tohru Uchida for his kind guidance and revision of the manuscript. He is indebted also to Assistant Professor Tomoji Aoto for his encouragement.

Material and method: The material used in the present study are *Idotea ochotensis*, *Cleantiella isopus*, *Mesidotea* sp. and *Idotea japonica*, all belonging to the family Idoteidae. The animals were usually fixed with Bouin's solution *in toto*, but some were fixed with Zenker's mixture immediately after being decapitated. The cephalic region was cut into serial sections at 10 μ thickness in routine paraffin method, and stained by Delafield's hematoxylin-eosin, Gomori-Halmi's PAF stain or Mallory's trichrome stain.

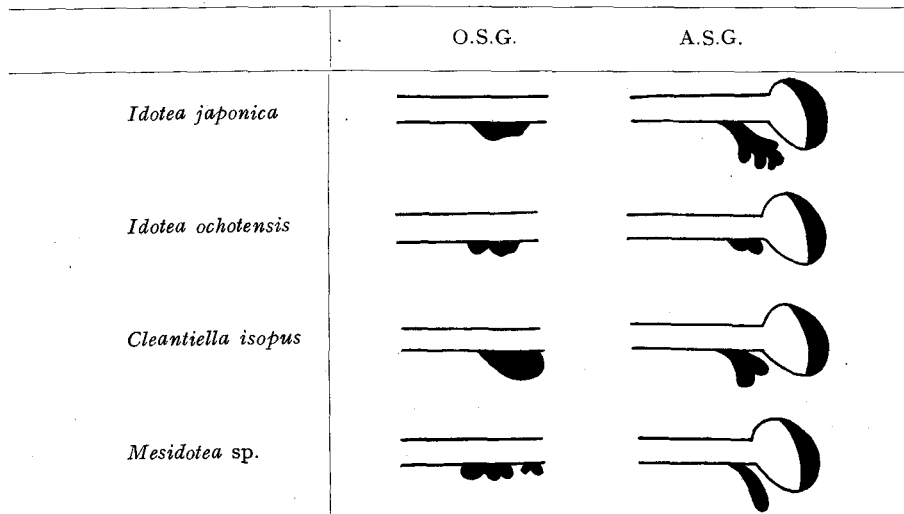
Observations

Examination of the nervous tissue in the cephalic region revealed that *I. ochotensis*, *Cleantiella isopus* and *Mesidotea* sp. possess two pairs of sinus gland, as is also the case in *I. japonica*. As already reported, in *I. japonica* the ordinary sinus gland is located on the ventral side of the optic lobe at the middle portion between the brain and the compound eye, while the accessory sinus gland is situated at the distal portion of the optic lobe near lamina ganglionaris (Oguro, 1959 a). In the three species newly observed, locality of the two pairs of sinus glands is similar to that seen in *I. japonica*. For convenience, a pair of the sinus gland lying in the middle portion of the optic lobe will be called ordinary sinus gland (O. S. G.), and another pair situated at the distal part of the optic lobe will be referred to accessory sinus gland (A. S. G.).

1) Studies on the neurosecretory system of isopods, I.

2) Contributions from the Akkeshi Marine Biological Station, No. 103.
Jour. Fac. Sci. Hokkaido Univ. Ser. VI, Zool. 14, 1959.

The O. S. G. of *I. ochotensis* is an outgrowth of gathering axones, and is rather irregular in shape in comparison with that of *I. japonica* (Fig. 1; Plate V, Fig. 2). It seems to be variable in size in different individuals, as noted by Miyawaki (1958) in *I. japonica*. The O.S.G. of *Cleantiella isopus*, as compared with that of *I. japonica* or *I. ochotensis*, is larger in size. Usually, the O.S.G. of *C. isopus* is not a small protuberance of axonal endings but an organ which projects from the optic lobe to some extent into the blood sinus, though slight



Text-fig. 1. Schematic illustration of external appearance of the two kinds of sinus gland.

variations are detectable in shape and in size (Fig. 1; Plate V, Figs. 3, 4). In *Mesidotea* sp., the size variation of the O.S.G. is remarkable. It lies beneath the medulla interna in the optic lobe. A good many nerve fibers, the sinus gland tract, are found along the ventral part of the optic lobe near the sinus gland. Acidophilic granules found in the sinus gland tract are similar in stainability to those in the sinus gland. The tissue of the O.S.G. of *Mesidotea* sp. does not form a mass, sometimes dispersing in surrounding blood sinus (Fig. 1; Plate V, Fig. 5).

The A.S.G. of *I. ochotensis* is smaller in size than that of *I. japonica*. As reported in the previous paper (Oguro, 1959 a), the tissue of the A.S.G. of *I. japonica* is comparatively compact near the optic lobe, but it becomes to be loose in the part distant from the optic lobe. In *I. ochotensis*, however, the tissue of the A.S.G. persists in a compact state all over it. The A.S.G. of *Cleantiella isopus* seems to be rather well-developed, though the dispersion of the sinus gland tissue as observed in the A.S.G. of *I. japonica* is not found. Its tissue is compact, and exhibits sometimes bi- or tri-lobular form. (Fig. 1; Plate V, Figs. 8, 9). The

A.S.G. of *Mesidotea* sp. resembles in form that of *Cleantiella isopus*, but is more slender and elongated. The tissue of it is rather compact (Fig. 1; Plate V, Fig. 10).

In the three species newly observed, both the O.S.G. and the A.S.G. are distinguishable from the surrounding tissue because these sinus glands are characteristically opaque white in fresh condition, as against semi-transparent color of the surrounding nervous tissue.

Remarks

It has been established that the sinus gland of the decapods is composed of bulbous nerve endings of the neurosecretory cells which are situated elsewhere (Passano, 1951 a; Bliss *et al.*, 1954; Knowles and Cartlisle, 1956). In all the isopods here reported, the sinus glands are fundamentally of the same structure with those of higher crustaceans despite of the characteristic constitution of the sinus glands (*viz.* two pairs). The O.S.G. and the A.S.G. are also composed of axonal endings which are filled with neurosecretory substances. The both sinus glands belong to the everse-type, accompanying without inner blood sinus.

In the previous paper (Oguro, 1959 a), the writer informed that no difference in stainability was detectable between the two sinus glands of *I. japonica*. From the detailed examinations, however, the writer became aware of that a few differences are present between the two sinus glands not only in stainability but also in other points described below. (1) The O.S.G. and the A.S.G. are usually filled with acidophilic substances, but certain portions of the O.S.G. occasionally show basophilic features. The A.S.G. does not exhibit such a feature, so far observed. (2) In *I. ochotensis* and *I. japonica*, the axonal endings which are composed of the sinus glands appear to be more fine in the O.S.G. than in the A.S.G., although the fact is undistinguishable in the remained two species, *Cleantiella isopus* and *Mesidotea* sp. (3) In the four species hitherto studied, the O.S.G. is markedly variable in size according to individuals, except that of *Cleantiella isopus* in which the size variation is not so remarkable. On the other hand, in the A.S.G. of these animals marked size variation is not observable. Although some degrees of size variation are noticeable, it may be included in a normal range of individual variations. In addition to these facts, the existence of differences in melanophorotropic action between the O.S.G. and the A.S.G. in *I. japonica* (Oguro, 1959 b) suggests the possible occurrence of functional differentiation between them, though no information has yet been given concerning the function of the sinus glands in the other three species.

Considering the aforementioned facts, the term of these sinus glands may be inadequate. It may be suggested that the accessory sinus gland, named by the writer, is really the ordinary, and reversely the ordinary sinus gland used in vague is accessory or additional.

Summary

It was found that three idoteid species, *Idotea ochotensis*, *Cleantiella isopus* and *Mesidotea* sp., possess two pairs of the sinus gland, as in *Idotea japonica* previously reported. Some morphological characteristics of the two sinus glands were described. Slight differences were detectable between the two kinds of the sinus gland. Especially, it arrested the attention that the size variation is striking in the ordinary sinus glands rather than in the accessory sinus glands.

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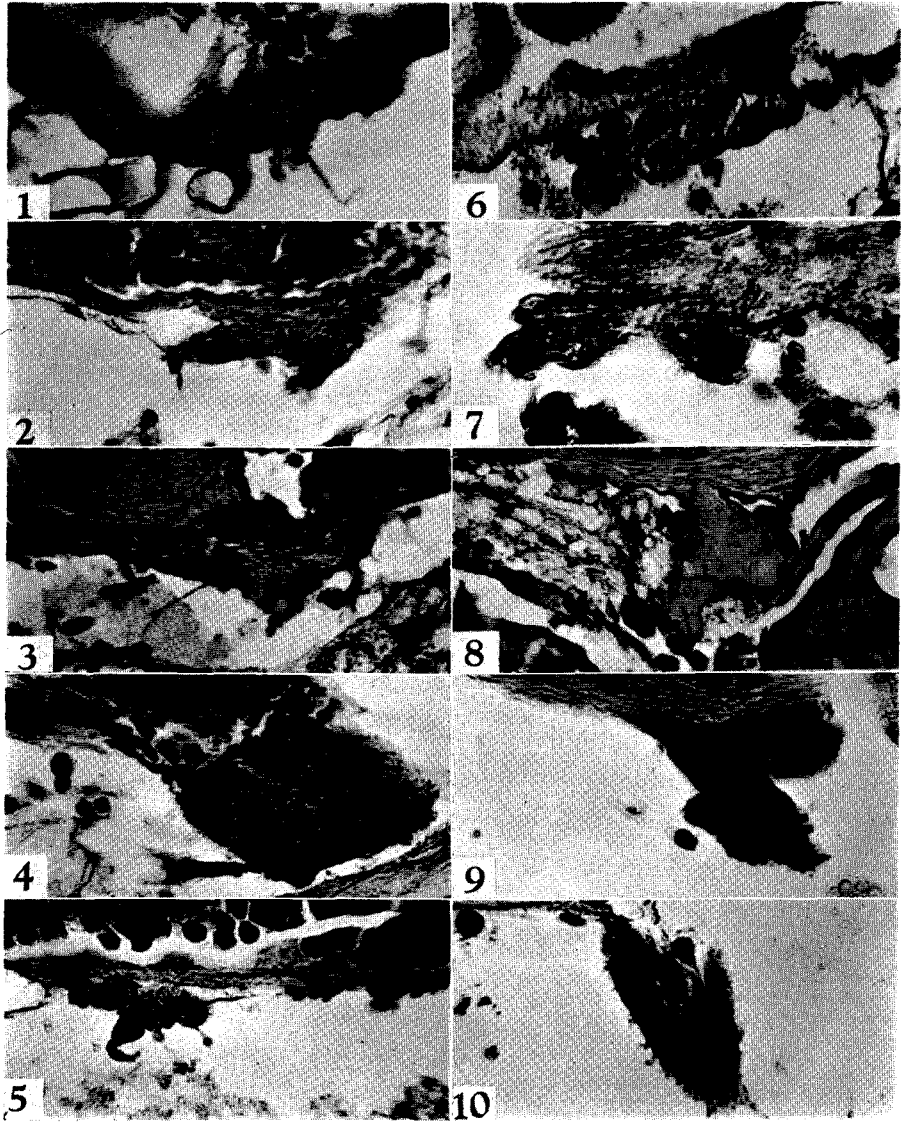
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Explanation of Plate V

All figures are microphotographs from longitudinal sections of sinus glands.

- Figs. 1-5: Ordinary sinus gland.
Figs. 6-10: Accessory sinus gland.

- Figs. 1, 6: *Idotea japonica*, PAF.
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C. Oguro : Sinus Glands of Four Species of Idoteidae

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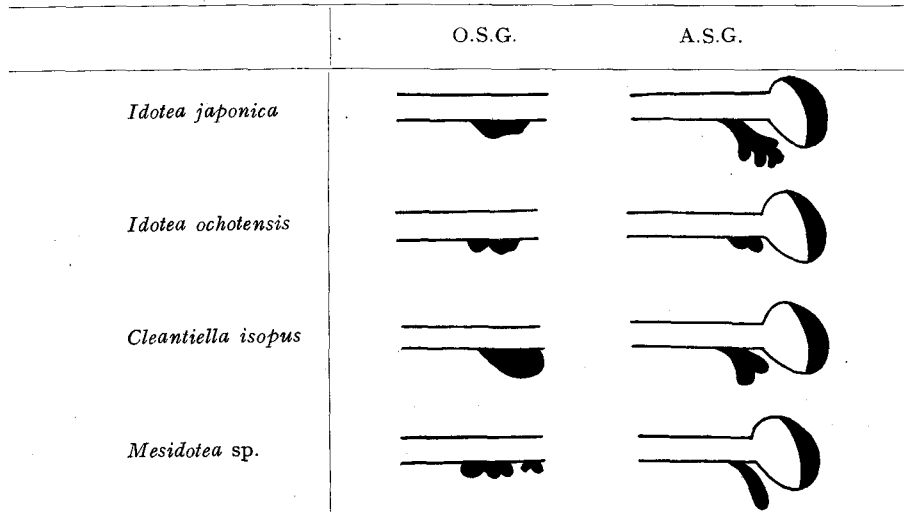
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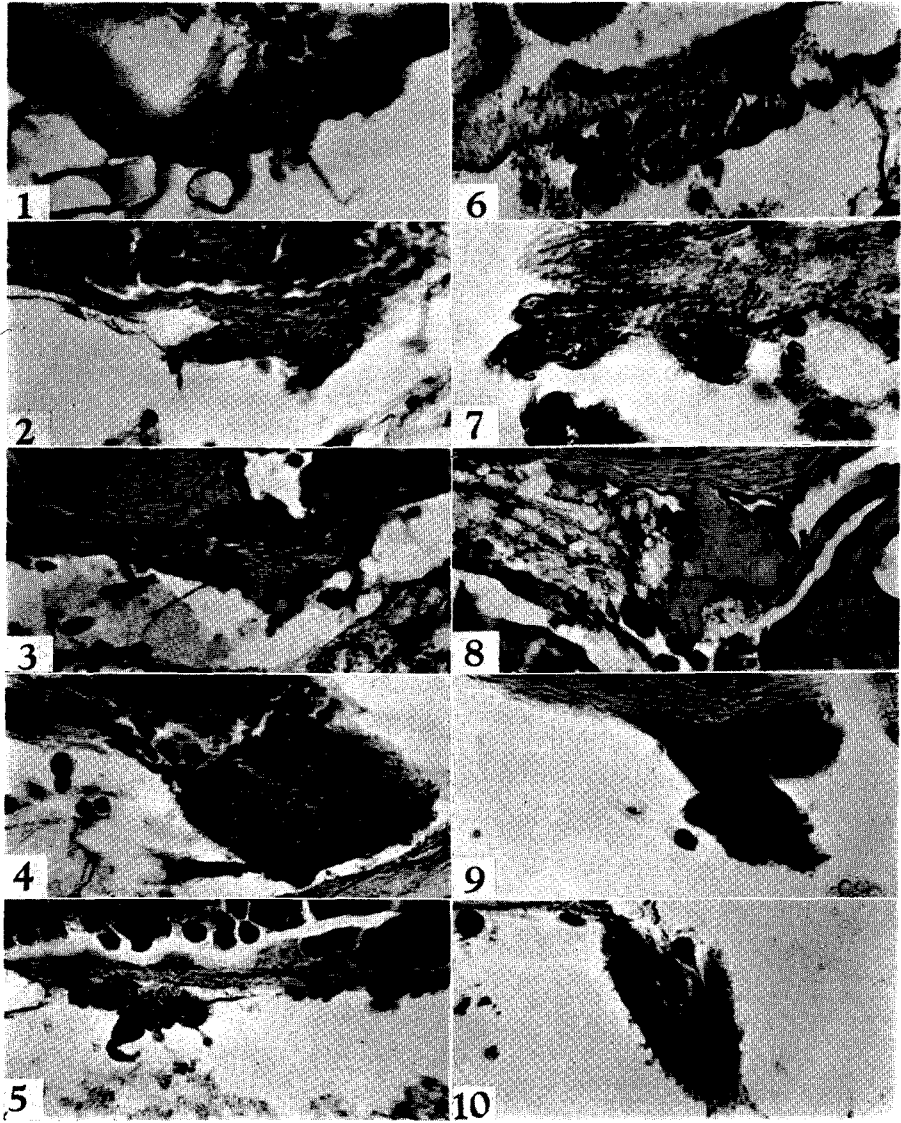
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