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THE FAUNA OF AKKESHI BAY
I. OPISTHOBRANCHIA¹⁾

BY

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(With 2 Plates)

The present notes are the result of the examination of a collection of Opisthobranchs from Akkeshi Bay, Hokkaidô. The collection was made during the survey by Professor Tohru UCHIDA, Messrs. Yoshine HADA, Masao IWASA, Shiro OKUDA and Hoshiro ISHIZUKA, and I take pleasure in expressing my warmest thanks to these gentlemen for giving me the opportunity of examining the specimens.

The list of forms examined is as follows:

Opisthobranchia

Order Sacoglossa

Family Stiligeridae

1. *Stiliger (Ercolania) akkeshiensis* nov. sp.

Order Acoela

Suborder Nudibranchia

Tribe 1. Holohepatica (= Doridacea)

Family Polyceridae

Subfamily Onchidoridinae

2. *Acanthodoris pilosa* (ABILDGAARD, 1789)
3. *Acanthodoris uchidai* nov. sp.

Family Dorididae

Subfamily Discodoridinae

4. *Peltodoris mauritiana* BERGH, 1889

Family Vayssièrideae

1) Contributions from the Zoological Laboratory, Kyûshû Imperial University, No. 78.

5. *Okadaia elegans* BABA, 1930
 Tribe 2. Cladohepatica (= Aeolidiacea)
 Family Dironidae
 6. *Dirona albolineata* MACFARLAND, 1912
 Family Aeolidiidae
 Subfamily Phyllodesmiinae
 7. *Aeolidia papillosa* (LINNÉ, 1761)
 Family Flabellinidae
 8. *Coryphella athadona* BERGH, 1875
 Family Tergipedidae
 9. *Cuthona* (*Cuthona*) sp.

The present collection, though small in number of species, is nevertheless interesting and important, because it adds materially to our hitherto meagre knowledge of Opisthobranchs in the colder parts of Japan. Two of the species, namely *Stiliger* (*Ercolania*) *akkeshiensis* and *Acanthodoris uchidai* appear to be new to science. *Acanthodoris pilosa* (ABILDGAARD) is a form that is recorded from England, Denmark, Aleutian Islands, Alaska and Vancouver Island Region; *Dirona albolineata* MACFARLAND is known from Vancouver Island Region and the coast of California; *Aeolidia papillosa* (LINNÉ) is a widespread species, being recorded from Norway, England, Alaska, Vancouver, California and Chile(?); it may be said that these 3 species occur in the colder seas of the world. The collection extends also the range of distribution of the following species northward, *Peltodoris mauritiana* BERGH, *Okadaia elegans* BABA, *Coryphella athadona* BERGH and *Cuthona* (*Cuthona*) sp.

The type-specimens and examples of all the species are deposited in the Zoological Institute, Hokkaidô Imperial University.

1. *Stiliger* (*Ercolania*) *akkeshiensis* nov. sp.

(Pl. 7, figs. 1-4)

Distribution in Japan: Akkeshi Bay.

The body is elongated and aeolidiform, and continues back into a well-defined sharply pointed tail (Pl. 7, fig. 1). It measures about

4 mm in length in the preserved state. The head is fairly large and broad in front and its antero-lateral corners are rounded. The rhinophore is stout, auriculate with a longitudinal groove on the latero-ventral side. The back is smooth and bears along the side a moderate number of branchial papillae in about 8 transverse rows of 2 or 3 each. The papillae are fairly large though short, inflated and deciduous (Pl. 7, fig. 4); they are attached to the body by relatively small bases, increase in breadth about midway of their length and then decrease towards the blunt ends. The foot is long, broadest at the front end where it is abruptly truncated, and passes off posteriorly into a pointed tail (Pl. 7, fig. 2).

The preserved specimens have traces of blackish mottles and streaks on the head, rhinophores, back, tail and sides, as is shown in the figure.

The radula consists of a single row of teeth, 5 in the descending and 35 in the ascending series, and is formulated as $40 \times 0.1.0$. Each tooth is in the form of a large blade (Pl. 7, fig. 3); the anterior margin is without denticles and the hinder margin is entire and not depressed in the middle.

Locality: Daikoku-shima (July 22, 1933; 6 specimens).

The present species is undoubtedly a member of the genus *Stiliger* (subgenus *Ercolania*) and is, as far as I can ascertain, the first species of that genus to be recorded from the Pacific coast of Japan. It differs from any previously recorded species in having the blackish mottles and streaks on the upper side of the body.

2. *Acanthodoris pilosa* (ABILDGAARD, 1789)

(Pl. 7, figs. 5-7)

Doris pilosa ABILDGAARD, MÜLLER'S Zoöl. Danica, ed. 3, vol. 3, 1789, p. 7, pl. 85, figs. 5-8.—Denmark; ALDER and HANCOCK, Monogr. Brit. Nudib., pt. 5, 1851, fam. 1, pl. 15.—England.

Acanthodoris pilosa BERGH, Proc. Acad. Nat. Sci. Philadelphia, 1880, pp. 240-246, pl. 9, figs. 12-13; pl. 11, fig. 1; pl. 13, fig. 5.—Kyska, Shumagin Islands; IREDALE and O'DONOGHUE, Proc. Malac. Soc. London, vol. 15, pt. 5, 1923, pp. 222-223; O'DONOGHUE, Trans. Roy. Canad. Inst., vol. 15, pt. 1, 1924, pp. 30-31.—Vancouver Island Region.

Acanthodoris pilosa var. *albescens* BERGH, *ibid.*, 1880, pp. 246-247, pl. 9, figs. 14-15; pl. 11, fig. 2; pl. 12, figs. 13-16; pl. 13, figs. 2-4.—Kyska.

Acanthodoris pilosa (var. *albescens*) O'DONOGHUE, *ibid.*, vol. 13, pt. 1, 1921, pp. 168-169, pl. 10, figs. 37-38.—False Narrows, Mudge Island, Horswell (Vancouver Island Region).

Acanthodoris pilosa var. *purpurea* BERGH, *ibid.*, 1880, pp. 247-252, pl. 12, figs. 1-9.—Aleutian Islands.

Distribution in Japan: Akkeshi Bay.

The larger specimen is 20 mm, and the smaller one 15 mm in length in the preserved state. The body is soft, subdepressed and oval in form (Pl. 7, fig. 5). The mantle is thick and wide, extending beyond the foot all around. The whole surface of the back is covered with closely-set conical papillae, some larger than others. The rhinophores are completely retractile within sheaths with papillated margins. The branchial plumes are 9 in number, arranged in the form of a circle and are not retractile within a sheath. The anal papilla lies in the centre of the circle and is surrounded by numerous papillae similar to those over the rest of the back. The head is large and veliform with a longitudinal slit-like mouth; it is continued out laterally to form 2 flattened triangular oral tentacles. The foot is well-developed, broad with a distinct transverse groove in front and bluntly pointed posteriorly.

The animal after preservation is of a uniform ashy white colour.

The labial disk is formed of a large number of small pointed scales arranged in the form of 2 curved, leaf-shaped plates nearly fused together (Pl. 7, fig. 7). The radula contains 25 rows of teeth, each row being composed of one large tooth and a series of 4 much smaller lateral teeth on each side; it is formulated as $25 \times 4.1.0.1.4$ (Pl. 7, fig. 6). The inner lateral tooth has a roughly oblong base bearing a strong spine at its antero-lateral corner. The spine is strengthened by a ridge running down to the basal plate and bears a few (about 4) irregular denticles which are very variable in number and may disappear altogether. The succeeding outer teeth are somewhat triangular in shape and decrease in size as they pass outward.

Localities: Akkeshi (July 30, 1932; 6 specimens), Daikoku-shima (July 23, 1933; 2 specimens).

The present species is known to be subject to a considerable range of colour variation.

3. *Acanthodoris uchidai* nov. sp.

(Pl. 7, figs. 8-10)

Distribution in Japan: Akkeshi Bay.

The body in the preserved state is oval and measures about 20 mm in length (Pl. 7, fig. 8). The mantle is thick, soft and wide and extends beyond the foot all around; its upper surface is quite smooth and not covered with conical papillae. The rhinophores are entirely retractile within slightly elevated sheaths. The branchial plumes are bipinnate, 10 in number and not retractile within a cavity; they are arranged approximately in a circle, near the centre of which lies the anal papilla. The head is well-marked, broad and continued out laterally into a pair of triangular oral lobes. The foot is broad, obtusely truncated at the front end and narrowed posteriorly.

The living animal is said to be whitish in colour.

The labial armatures are formed of a large number of closely-set pointed scales (Pl. 7, fig. 9). The radula formula is $30 \times 7.1.0.1.7$ (Pl. 7, fig. 10); the inner lateral tooth is very much larger than the succeeding teeth, and consists of a roughly oblong base bearing a strong spine at its antero-lateral corner. The spine is strengthened by a ridge but shows no sign of denticulation.

Locality: Daikoku-shima (July 23, 1933; 2 specimens).

The main characters by which the present species is distinguished from the previously recorded species are (1) the smooth back and (2) the non-denticulate teeth.

4. *Peltodoris mauritiana* BERGH, 1889

Peltodoris mauritiana BERGH, Malac. Unters., bk. 16, pt. 2, 1889, pp. 815-817.—Mauritius; BABA, Sci. Rep. Tôhoku Imp. Univ. ser. 4, vol. 10, no. 2, 1935, pp. 346-347, text-fig. 10.—Mutsu Bay.

Distribution in Japan: Mutsu Bay and Akkeshi Bay.

Locality: Akkeshi (April 13, 1933; 1 specimen).

5. *Okadaia elegans* BABA, 1930

Distribution in Japan: Tomioka, Toba, Zushi, E-no-shima, Tateyama, Mutsu Bay and Akkeshi Bay.

Locality: Akkeshi Bay (July, 1932; several specimens).

6. *Dirona albolineata* MACFARLAND, 1912

(Pl. 7, figs. 11-16; Pl. 8, figs. 1-2)

Dirona albolineata MACFARLAND, Zool. Jahrb., Suppl., bk. 15, vol. 1, 1912, pp. 518-520, pl. 30, fig. 2; pl. 31, figs. 11-19; pl. 32, fig. 21.—Monterey Bay (California); O'DONOGHUE, Trans. Roy. Canad. Inst., vol. 13, pt. 1, 1921, pp. 181-183, pl. 8, figs. 23-24.—Nanaimo, Jesse Island, Northumberland Channel (Vancouver Island Region); O'DONOGHUE, *ibid.*, vol. 15, pt. 1, 1924, pp. 24, 31.—Shingle Point, Bentinck Island (Vancouver Island Region); O'DONOGHUE, Jour. Entom. Zool. Claremont, vol. 19, 1927, pp. 102-103, pl. 3, figs. 64-67.—Laguna Beach (California).

Distribution in Japan: Akkeshi Bay.

The body in the preserved state is 20 mm in length (Pl. 8, figs. 1-2). It is aeolidiform, rounded in front but passing to a point behind. The head is expanded to form a thin semicircular veil with a wavy margin. No labial tentacles are present. The rhinophores are long, non-retractile and without sheaths, and pass forward and outward. The stalk is short and subcylindrical and the clavus is obliquely perfoliated. The branchial papillae are large, inflated, lanceolate and without cnidosacs. They are arranged irregularly along the dorso-lateral margins in closely-set series, which extend from the front of the rhinophores to the tail. The inside papillae are the largest and the outer ones are much smaller. The greater part of the back is bare and smooth. The genital opening lies on the right side anterior to the middle of the body-length; the anus opens at the summit of a conspicuous papilla far back, on the same side, just below the branchial papillae. The mouth is a longitudinal slit situated on the ventral side of the head-veil. The foot is flat and large; at the front end it is thickened, not bilabiate and abruptly rounded; it is prolonged into a pointed tail behind.

The preserved specimens are uniformly ashy gray in colour.

The jaw-plates are very large relative to the size of the animal, and are roughly in the form of a shallow shell (Pl. 7, figs. 13-14). At the front edge they are produced in a thin, wide, approximately triangular hood and the cutting edges are also continued out into a sort of collar. Internally they are divided by a keel-like outgrowth into an upper and a lower half.

The radula contains 25 rows of teeth, each row being formed of one central tooth and 4 lateral teeth; it may be formulated as $25 \times 2.1.2$ (Pl. 7, fig. 11). The central tooth is very small and is formed of an almost square base with a fairly broad blunt spine. The 1st lateral tooth is small, roughly triangular or hamate and carries a series of several (12) denticles on one side of a spine (Pl. 7, fig. 12). The 2nd lateral tooth is far larger, stout and hamate; it consists of a slightly curved base and a large curved smooth spine.

The liver is in a mass, but it is superficially fissured into several lobes which send no diverticula into the branchial papillae. The gonad is formed of several (6) lobes (Pl. 7, fig. 15, d). The penis is conical and no special armatures are visible here (Pl. 7, fig. 16).

Localities: Akkeshi (July 30, 1932; 2 specimens), Daikoku-shima (July 23, 1933; 3 specimens).

Though there exist some small differences in the character of the penis and in the number of denticles of the 1st lateral tooth, the specimens in hand are, for the present, to be referred to *Dirona albolineata* MACFARLAND by virtue of having (1) the smooth, non-tuberculate branchial papillae and (2) the fairly broad blunt spine of the central tooth.

7. *Aeolidia papillosa* (LINNÉ, 1761)

(Pl. 8, figs. 3-5)

Limax papillosus LINNÉ, Fauna Suecica, ed. 2, 1761, p. 508.—Norway Sea.

Eolis papillosa ALDER and HANCOCK, Monogr. Brit. Nudib., pt. 6, 1854, fam. 3, pl. 9.—England.

Aeolidia papillosa BERGH, Proc. Acad. Nat. Sci. Philadelphia, 1879, pp. 130 (74)-131 (75).—Sanborn Harbour, Nagai, Shumagin Islands; ?BERGH, Zool.

Jahrb., Suppl., vol. 4 (Fauna Chilensis, vol. 1), 1898, p. 541.—Chile; O'DONOGHUE, Trans. Roy. Canad. Inst., vol. 13, pt. 1, 1921, pp. 199–201, pl. 9, fig. 31.—Departure Bay (Vancouver Island Region); IREDALE and O'DONOGHUE, Proc. Malac. Soc. London, vol. 15, pt. 5, 1923, p. 201; O'DONOGHUE, Jour. Entom. Zool. Claremont, vol. 19, 1927, pp. 108–109, pl. 3, fig. 77.—Laguna Beach (California).

Distribution in Japan: Akkeshi Bay and Sakhalin.

The preserved animal is elongated, abruptly rounded in front and passing off to a fine tail posteriorly (Pl. 8, fig. 3). The largest specimen is 25 mm and the smallest one 15 mm in length. The branchial papillae are fusiform, very deciduous and arranged in about 17 oblique rows, each containing from 12 to 25. They begin to appear in front of the rhinophores, and are set mainly on the dorso-lateral margins, leaving about the front half of the mid-dorsal region free but covering its posterior half. The antero-lateral corners of the head are continued out into 2 long pointed oral tentacles. The rhinophores are at a short distance behind the oral tentacles and are conical and smooth. The anal papilla lies between the 9th and 10th branchial rows on the right side; the genital opening is found outside the 6th row on the same side. The foot is well developed; anteriorly it is separated by a clear transverse groove into an upper and a lower lip and continued out laterally into 2, not very marked points; it passes off into a pointed tail posteriorly.

The living animal is said to be white with black papillae.

The jaw-plates are strong and are in the form of a roundish shallow shell (Pl. 8, fig. 4). The cutting edge is smooth and continued out into a strong pointed masticatory process. The radula is uniseriate, contains 32 teeth in the largest specimen and is formulated as $32 \times 0.1.0$. Each tooth is of a characteristic crescent shape with its hinder border smooth (Pl. 8, fig. 5); the anterior border bears a series of long, pointed, closely approximated denticles varying from 45 to 60 in number. The median notch is not clear. In the smallest specimen the radula is formed of 22 teeth, each having one small but distinct median denticle and 32–34 strong lateral denticles.

Localities: Akkeshi (April 13, 1933; 1 specimen), Aikap (July 8 and August 5, 1933; 3 specimens).

The specimens in hand are identifiable with *Aeolidia papillosa* (LINNÉ) by having a moderate number of branchial rows and by having a foot which is pointed at the antero-lateral corners. One specimen of the same species has been collected by Mr. Tomoe URITA in Sakhalin.

8. *Coryphella athadona* BERGH, 1875

(Pl. 8, figs. 6-8)

Coryphella athadona BERGH, Verh. k. k. zool.-bot. Gesell. Wien, vol. 25, 1875, pp. 635-638, pl. 13, figs. 1-13.—Japan Sea (39°40'-40°N. Lat., 133°30'-134°W. Long.); BABA, Sci. Rep. Tôhoku Imp. Univ., ser. 4, vol. 10, no. 2, 1935, pp. 352-353, text-fig. 15.—Mutsu Bay.

Distribution in Japan: Japan Sea, Mutsu Bay and Akkeshi Bay.

The preserved animal is elongated and aeolidiform and passes back to terminate in a fairly well-defined tail. It measures about 15 mm in length. The back is flattened and marked off from the sides of the body by a flange-like fold. The branchial papillae are numerous, conical or fusiform and are crowded on the lateral sides of the back in (about 30) oblique rows. The antero-lateral ends of the head are continued out into two conical oral tentacles; the rhinophores are at a short distance from them and are conical and simple. The foot is well developed; the anterior end is obtusely truncated with rounded corners and the posterior end is narrowed.

The animal in the preserved state is ashy gray.

The jaw-plates are each in the form of a shallow shell with a produced masticatory process (Pl. 8, figs. 7-8); the cutting edge is armed with closely-set pointed or irregular denticles. The radula contains 25 rows of teeth, 3 in a row; it is formulated as $25 \times 1.1.1$ (Pl. 8, fig. 6). The central tooth is of a somewhat rectangular horseshoe-shape with a round posterior and a triangular anterior margin; its apex is marked by a median spine-like denticle, with 7-9 pointed denticles on each side. The lateral tooth consists of a

roughly triangular plate with a strong apical spine and a series of 7-9 small denticles on the inner edge.

Localities: Akkeshi (April 13, 1933; 1 specimen), Daikoku-shima (July 23, 1933; 1 specimen).

9. *Cuthona* (*Cuthona*) sp.

(Pl. 8, figs. 9-13)

Cuthona (*Cuthona*) sp. BABA, Sci. Rep. Tôhoku Imp. Univ., ser. 4, vol. 10, no. 2, 1935, p. 357.—Mutsu Bay.

Distribution in Japan: Mutsu Bay and Akkeshi Bay.

The preserved animals are about 7 mm long and ashy in colour (Pl. 8, fig. 9). The oral tentacles are at the antero-lateral corners of the head and are conical and smooth; the rhinophores are conical, smooth and approximating and are at a short distance behind the oral tentacles. The back is smooth and bears along the sides a large number of branchial papillae in 10 oblique rows, the largest being on the inside and the smallest outside; they are about 3 in the 1st row, 5 in the 2nd row, 7 in the 5th and 6th rows, and decrease in number in the succeeding rows. The anus lies between the 6th and 7th rows and the genital opening below the 3rd row on the right side. The foot is well marked and elongated; posteriorly it is pointed and in front abruptly rounded (Pl. 8, fig. 10).

The jaw-plates are roughly triangular in shape (Pl. 8, figs. 11-12); the masticatory edge bears a series of 14 pointed or obtuse denticles. The radula is uniseriate and contains about 35 teeth; it is formulated as $35 \times 0.1.0$. Each tooth is of a rectangular horse-shoe-shape with a round posterior and a triangular anterior margin (Pl. 8, fig. 13); the apex is marked by a strong median spine, on each side of which runs a row of sharp, somewhat curved denticles, varying from 5 to 7 in number.

Localities: Ko-shima (July 9, 1933; 1 specimen); Aikap (August 5, 1933; 1 specimen).

The specimens are referred to the genus *Cuthona* (subgenus *Cuthona*) by virtue of having a uniserial radula and a single series

of denticles on the masticatory edge of the jaw-plate. They agree with the English species, *Cuthona (Cuthona) nana* (ALDER and HANCOCK, 1842) in the general form of the body and of the teeth, but the definite identification is to be reserved until investigation of the living animal can be made.

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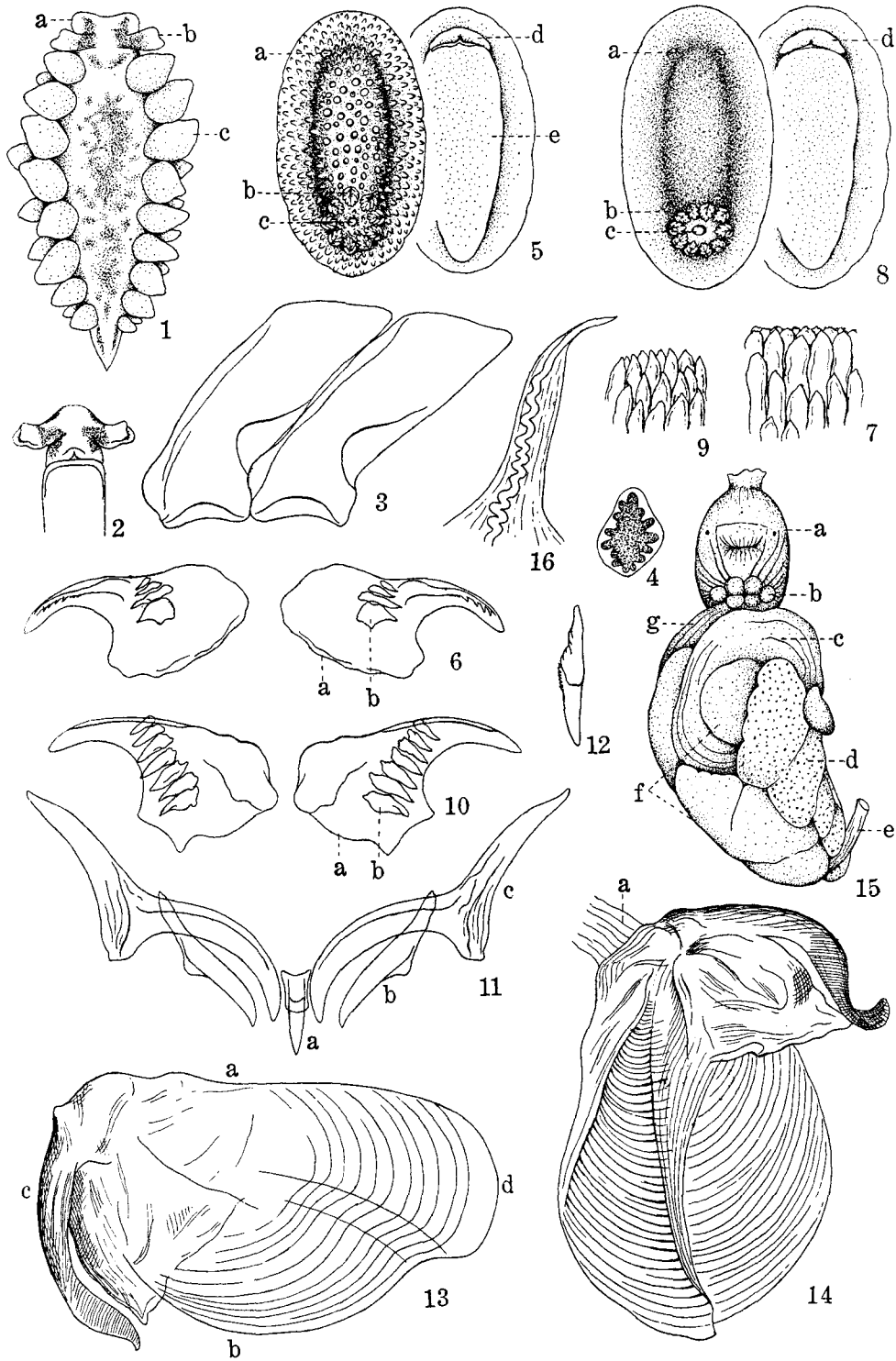
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Plate VII

Explanation of Plate VII

- Fig. 1. *Stiliger akkeshiensis* nov. sp. ($\times 12$). a. head, b. rhinophore, c. branchial papillae.
- Fig. 2. ——— Head and foot.
- Fig. 3. ——— Teeth of the radula ($\times 500$).
- Fig. 4. ——— A branchial papilla.
- Fig. 5. *Acanthodoris pilosa* (ABILDGAARD) ($\times 2$). a. rhinophore-sheath, b. branchial plumes, c. anus, d. oral veil, e. foot.
- Fig. 6. ——— A row of the radula ($\times 60$). a. inner lateral tooth, b. outer lateral teeth.
- Fig. 7. ——— Elements of the labial armature ($\times 375$).
- Fig. 8. *Acanthodoris uchidai* nov. sp. ($\times 2$). a. rhinophore-sheath, b. branchial plumes, c. anus, d. oral veil.
- Fig. 9. ——— Elements of the labial armature ($\times 375$).
- Fig. 10. ——— A row of the radula ($\times 60$). a. inner lateral tooth, b. outer lateral teeth.
- Fig. 11. *Dirona albolineata* MACFARLAND. A row of the radula ($\times 110$). a. central tooth, b. 1st lateral tooth, c. 2nd lateral tooth.
- Fig. 12. ——— First lateral tooth, side view.
- Fig. 13. ——— Left jaw-plate, outside view ($\times 8$). a. dorsal, b. ventral, c. anterior, d. posterior.
- Fig. 14. ——— Inside view of the same organ. a. ligament.
- Fig. 15. ——— Visceral organs, dorsal view ($\times 5$). a. pharyngeal bulb, b. central nervous system, c. stomach, d. gonads, e. rectum, f. liver, g. oesophagus.
- Fig. 16. ——— Penis ($\times 7$).

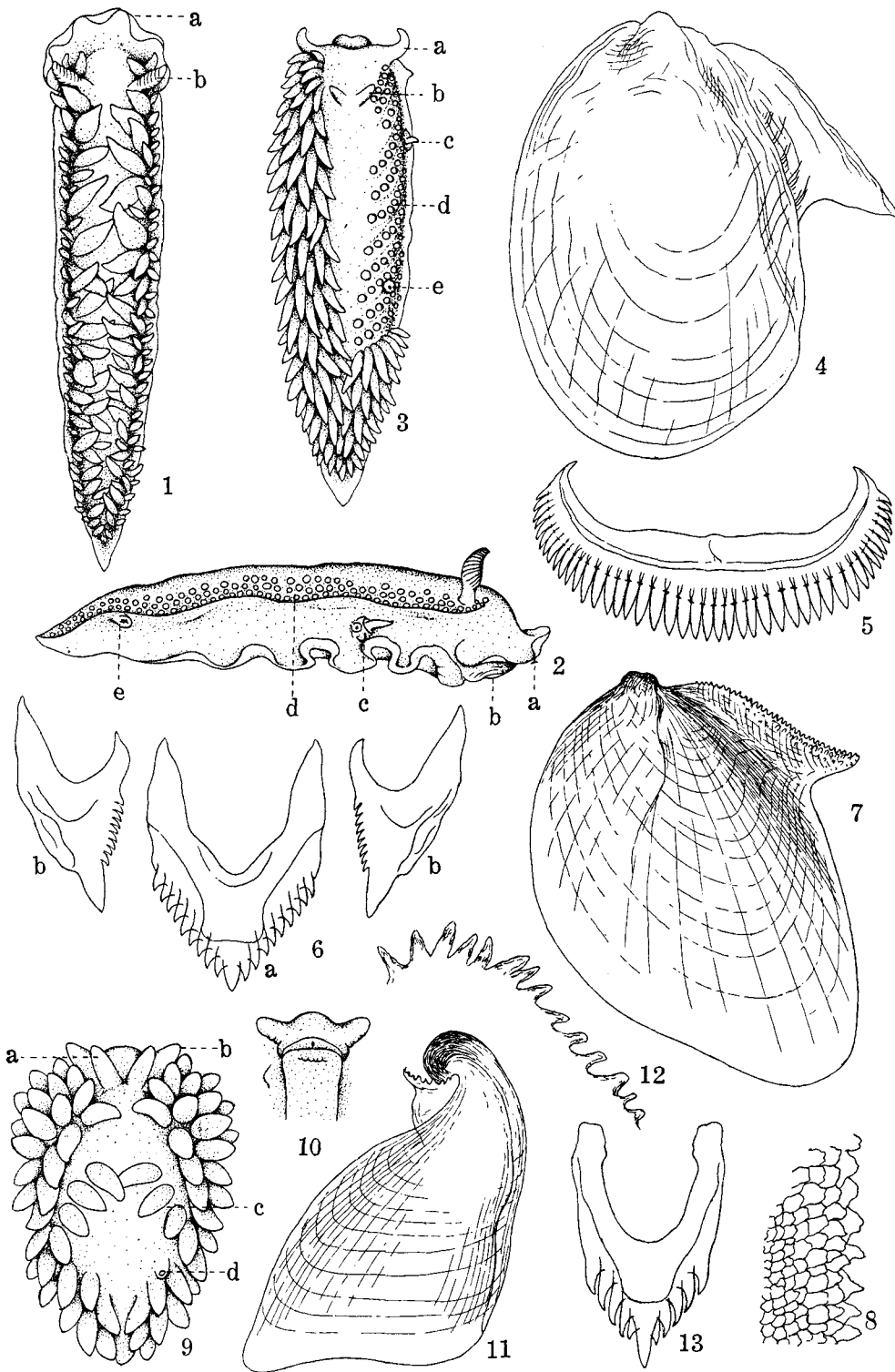


K. Baba: Opisthobranchia of Akkeshi Bay

Plate VIII

Explanation of Plate VIII

- Fig. 1. *Dirona albolineata* MACFARLAND ($\times 4$). a. head-veil, b. rhinophore.
- Fig. 2. ——— Side view. a. head veil, b. mouth, c. genital orifice, d. sites of the branchial papillae, e. anus.
- Fig. 3. *Aeolidia papillosa* (LINNÉ) ($\times 2.5$). a. oral tentacle, b. rhinophore, c. genital orifice, d. sites of the branchial papillae, e. anus.
- Fig. 4. ——— A jaw-plate, outside view ($\times 13$).
- Fig. 5. ——— A tooth of the radula ($\times 80$).
- Fig. 6. *Coryphella athadona* BERGH. A row of the radula ($\times 250$). a. central tooth, b. lateral teeth.
- Fig. 7. ——— A jaw-plate, outside view ($\times 110$).
- Fig. 8. ——— Denticles on the cutting edge of a jaw-plate ($\times 250$).
- Fig. 9. *Cuthona* sp. ($\times 7$). a. rhinophore, b. oral tentacle, c. branchial papillae, d. anus.
- Fig. 10. ——— Head and foot.
- Fig. 11. ——— A jaw-plate, outside view ($\times 100$).
- Fig. 12. ——— Denticles on the cutting edge ($\times 600$).
- Fig. 13. ——— A tooth ($\times 250$).



K. Baba: Opisthobranchia of Akkeshi Bay