

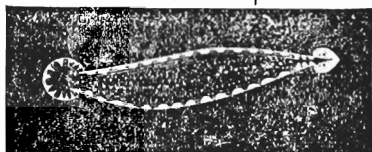
ART. XIX.—*Brief Contributions to Zoölogy from the Museum of Yale College.* No. XVII.—*Descriptions of North American fresh-water Leeches*; by A. E. VERRILL.

*Cystobranchus vividus*, sp. nov. Figure 1.

Body elongated, somewhat depressed, tapering both ways, but most so anteriorly. Surface smoothish, but with minute, hemispherical hyaline vesicles.

Length in extension about one inch; breadth in middle .10 to .12 of an inch. Head excentrically pedicellate upon a slender neck, small, disk-like, rounded in front, or somewhat

Fig. 1. ♂



heart-shaped with the rounded point forward. Ocelli four, small, brownish, placed near the attachment of the neck, on each side, those in the anterior pair farther apart. Acetabulum large, well-rounded, as wide as the body, disk-shaped, and attached nearly centrally. Male organ, when protruded, elongated, conical, acute, placed just behind the fourth pair of large lateral white spots.

Color of back dusky brown or purplish brown, finely specked with stellate points of darker brown, and with three irregular rows of conspicuous, small, round, opaque white spots along the upper surface of the back. Sides with a row of about 16, larger and more conspicuous, semicircular, white spots along the margin, each consisting of a cluster of 3 to 9 small round spots, enclosing a more transparent area in which a diaphanous pulsating vesicle or enlarged vessel may be seen to protrude at each dilation. Lower surface of body light grayish, specked with darker and often with obscure transverse bands of whitish; acetabulum similar in color to the body, with small round white spots, the margin more or less radiated with lighter and darker. Upper surface of head similar to the back, the sides and front lighter.

West River, near New Haven, on *Fundulus pisculentus*, November and December, 1871,—F. S. Smith; Savin Rock, in salt water, among eel-grass,—Prof. J. E. Todd.

This very active species lives in both fresh and salt water.

The transparent lateral vesicles referred to are probably organs of respiration, analogous to the much more highly developed branchial appendages of *Branchiobdella*.

*Ichthyobdella Funduli*, sp. nov.

Body smooth, distinctly annulated, subterete, thickest at about the posterior third, tapering considerably toward the head, and slightly posteriorly. Length about .75 of an inch;

greatest diameter about .08. Head small, rounded in front, scarcely explanate, and separated only by a slight constriction from the body. Ocelli two, distinct, well separated, placed near the posterior part of the head; two others, very small and scarcely distinguishable in my specimens, are placed in front of these. Acetabulum scarcely wider than the body, obliquely attached, sessile, and scarcely separated by a constriction from the body. Color light green, finely specked with dark green and brown points.

West River, on *Fundulus pisculentus*, Nov. and Dec., 1871,—F. S. Smith; near New Haven, on the same fish,—Prof. J. E. Todd.

This species differs greatly, in the form and arrangement of the acetabulum and head, from the typical species of the genus, and when living specimens can be carefully studied, may require separation.

*Ichthyobdella punctata* Verrill, from Lake Superior, described in the December number of this Journal, is the only other species of this genus known to me from the fresh-waters of this country, but others probably exist. In addition to the characters mentioned for the last species, the specimen has a median pale dorsal line and a row of eight spots on each margin, alternate with the dark punctate bands.

#### CLEPSINE Savigny.

This genus is very abundantly represented in our waters, both in individuals and species. Although but two recognizable species have hitherto been described from this country, several others are very frequently met with, and are widely distributed. They are most frequently found adhering to the under surfaces of floating logs and old pieces of boards, or beneath the loosened bark of submerged branches and trunks of decaying trees. Occasionally they adhere to the lower surface of turtles or other animals, but they seldom, if ever, suck blood. They feed upon insect larvæ, small worms, etc. Most of the species are elegantly, and some are quite brilliantly colored, but the colors are often quite variable in the species, and cannot be relied upon for distinguishing them, without other characters of more importance. When disturbed, these species curl themselves up after the manner of "pill-bugs" and certain insect larvæ. The young adhere in a group to the posterior part of the lower surface of the body of the parent, by means of the posterior sucker, and before quitting the parent usually present the essential characters and often nearly the pattern of color of the adult, though paler.

## Section A. Ocelli 2, separate or confluent.

## Subsection a. Back smooth.

*Clepsine parasitica* Diesing.

*Hirudo parasitica* Say, Major Long's 2nd Expedition to the source of St. Peter's River, Lake Winnepeek, etc., vol. ii, p. 266, 1824.

*Clepsine parasitica* Diesing, Systema Helminthum, vol. i, p. 450, 1850.

Body smooth, but distinctly annulated, much depressed, broad, tapering anteriorly to the obtusely rounded head, broad and emarginate posteriorly, with a broad round posterior sucker or acetabulum, about half of which is exposed behind the end of the body. Length in extension 3 inches; greatest breadth .3 to .5 of an inch, according to the degree of extension. Ocelli usually united into one inconspicuous spot, placed near the anterior margin of the head; two or three other minute black spots, somewhat resembling ocelli, sometimes occur along the margins of the head anteriorly.

Upper surface variegated with green, yellow, and brown; the ground-color is usually dark greenish brown, with a broad median vitta of pale greenish yellow, which at intervals expands into several large irregular spots; unequal, oval, and rounded spots are also irregularly scattered over the back. The entire margin is surrounded by a series of alternating square spots of dark green and yellow. Lower surface longitudinally striped with numerous purplish brown and black lines, the margin spotted like that of the upper side.

West River, near New Haven, on lower side of floating wood, and at Norway, Maine,—A. E. Verrill; frequent in the lakes of the North-western States, adhering to the sternum of tortoises,—Say.

This species is one of the largest and most conspicuously colored of the genus.

*Clepsine picta*, sp. nov.

Body smooth, much depressed, broad posteriorly, somewhat tapering anteriorly, about 2.50 inches long in extension; varying in greatest breadth, from .25 to .30 of an inch. Acetabulum large, rounded. Ocelli two, close together, and sometimes confluent, surrounded by a triangular white area, which extends backward. Color of upper surface dark brownish green, finely variegated with orange; toward the margins the green becomes brighter; a row of semicircular orange spots, centered with flesh-color or white, extends along each margin; small, distant, flake-white spots are scattered over the upper surface, and arranged in about five irregular longitudinal rows. Acetabulum varied with green and orange, the green forming rays toward the margin, alternating with salmon-colored spots. Lower surface darker than the upper, deep greenish on the central part.

Another variety agrees in most respects with the preceding, but has a median brown line along the back, interrupted by about six, irregular, light green blotches, the last one largest and elongated; the rest of the back purplish brown, varied with greenish, the colors appearing as if in fine checks, owing to lighter and darker lines running in both directions; a row of rounded light green spots on each side, midway between the dorsal line and margins, and a row of flesh-colored, semicircular spots, alternately large and small, along the margin. Acetabulum varied with light purple and flesh-color. Lower surface pale bluish with lighter lines.

A young specimen, about .75 of an inch long, had the same pattern of color; but the upper surface was lighter, reddish brown, and the dark brown lobes of the intestine were visible through the integuments.

Other variations of color were observed. In some the blotches interrupting the median brown line were dull orange and the marginal spots were orange-yellow; the sides of the back were orange-brown, thickly specked with dark brown and with a row of small pale green spots on each side; lower surface plain purplish brown: and there was a whitish spot in front of the ocelli. In one specimen the dorsal brown line was not interrupted, and the back was finely variegated with green, orange, and flesh-color, the green in stellate specks, with a row of small white spots on each side; the marginal spots pale orange-yellow.

Whitneyville Lake and West River, near New Haven, common, on submerged or floating wood, and beneath dead bark,—A. E. Verrill.

*Clepsine modesta*, sp. nov. Figure 2.

Body in extension elongated, tapering and very slender anteriorly, broader and obtusely rounded posteriorly. Length 1.5 inches in extension. Back smooth, faintly annulated, translucent. Head small, obtuse; whitish. Ocelli two, black, near together. The general color above is pale purplish brown, or purplish flesh-color with minute specks of brown, and very small round spots of dull yellow, and often of light green; margins and a median dorsal line pale. Acetabulum moderately large, whitish. Auditory vesicle or "cervical gland" placed near the head, small, rounded, slightly prominent, conspicuous, deep brown, surrounded by a whitish circle. Lower surface pale purplish. The attached young, about .3 of an inch long in extension, were slender, whitish, and sub-diaphanous, with the brown intestine showing through posteriorly.

Fig. 2.



West River and Whitneyville Lake, with the preceding, common.

Subsection b. Back papillose.

*Clepsine ornata*, sp. nov.

Body somewhat depressed, rather broad and obtusely rounded posteriorly, in extension tapering, but not slender, anteriorly, about 1.25 inches long. In contraction elliptical, and about .20 broad in the middle. Back with a median papillose dorsal carina, and two similar ones midway between it and the margins. Head broad, acuminate, whitish in front and at the margin. Ocelli united into a single, small, transverse spot, situated at the edge of the white area. Acetabulum moderately large, round, about half of its breadth exposed behind the end of the body.

A dark green line passes along the median carina, interrupted anteriorly by several transverse orange vittæ, and farther back by some pale orange spots; the first of the transverse spots or vittæ is pale orange, and is just behind the white area of the head; this is followed by a transverse greenish brown one, which is succeeded by a longer transverse orange one; farther back is another transverse vitta, or band, of the same color. The posterior part of the back and upper side of acetabulum are flesh-color, specked with pale orange and purplish. The papillæ of the lateral carinæ are partly orange and partly brown. The margin is pale purplish, with conspicuous squarish spots, alternately bright green and orange. The rest of the upper surface is variegated with bright green and pale brown, and specked with darker brown. Lower surface pale green, with a median light line; the margins colored as on the upper side.

The attached young, June 6th, were about .12 of an inch long, and very slender in extension. Anteriorly they were purplish red with bright red specks, and with a median row of red points, while several median white spots occupied the positions of the large transverse orange spots of the adults. Posteriorly the branched lobes of the intestine gave a greenish color to the body. Ocelli closely united into a transversely triangular or bilobed spot of bright red.

West River, on the lower sides of submerged wood and pieces of boards.

*Clepsine papillifera*, sp. nov.

Body decidedly convex above, broad and obtusely rounded behind; in extension long, slender, and tapering anteriorly. Length, when extended, about 1 inch; greatest breadth, in contraction, about .20 of an inch. Back covered with small, distant, subconical papillæ, arranged in transverse rows, of which the anterior contain about three papillæ, and the posterior ones

eight or nine. Head small, narrow, subacute, white in front. Ocelli two, distinct, but close together, black, placed at the posterior edge of the white area. Color above obscure yellowish brown, produced by alternating narrow lines of flesh-color and olive-brown, which are crossed by fine longitudinal lines of dull olive-green, giving a checkered appearance under the microscope. The dorsal papillæ are specked with opaque white at the tips, and usually surrounded by a darker spot of olive green at the base.

West River and in small tributary streams, among the stems of water plants and on floating wood, common,—A. E. Verrill.

*Variety b.* Specimens taken in Whitneyville Lake, Oct, 4th, carrying young, differ considerably from the preceding, and may prove distinct. These have the form of body, head, and ocelli as described, but the tubercles of the back are less numerous, forming a single median row anteriorly, which becomes double posteriorly, where there is also a row on each side, midway between it and the margin. The general color above is dull greenish yellow, transversely and longitudinally lined with lighter; the tubercles are dark brown, and small flesh-colored spots are scattered over the back, but form rows posteriorly. Lower surface lighter.

*Variety c.* One specimen, perhaps distinct, has the ocelli united into a single spot, and the back covered with numerous small, scattered papillæ. The color was not recorded.

Section B. Four ocelli.

No American species belonging to this section are known to me.

Section C. Six ocelli.

Sub-section a. Back smooth.

*Clepsine pallida*, sp. nov. Figure 3, *a*; head enlarged.

Body depressed, broad and obtusely rounded posteriorly, tapering, but not very slender, anteriorly; about 1 inch long in extension, and .15 of an inch broad in contraction. Back smooth, somewhat convex. Head obtuse, with six ocelli, those of the anterior pair nearer together. Acetabulum rather small. Intestine whitish, showing through the integuments, with two large anterior lobes and about six smaller lateral ones. Auditory vesicle very distinct. Color above pale yellowish, with scattered blackish specks and with a median light line, interrupted by a row of distant, small, black spots. Beneath pale flesh-color.



West River, with the preceding,—A. E. Verrill.

## Sub-section b. Back papillose.

*Clepsine elegans*, sp. nov. Figure 3, b; head enlarged.

Body depressed, strongly annulated, broadly rounded posteriorly, tapering, but not slender, anteriorly. Length in extension about 1.25 inches; breadth in contraction .20 of an inch. Acetabulum moderately large, projecting considerably beyond the posterior end of the body. Head small, obtusely pointed, white in front and along the edges. Ocelli six, the three pairs close together, on the white area of the head, those of the middle pair largest, black. Back covered with distant, slightly elevated, yellow papillæ. Color olive-green, thickly specked, especially toward the margins, with purplish-brown, and with dark-brown transverse lines corresponding with the intervals between the annulations; anteriorly there is a pale yellowish-green median line; a slight distance from the middle there is, on each side, a narrow black line extending the whole length, and between these and the margins there are other faint longitudinal lines. Along each margin there is a row of about six, sulphur-yellow spots, and a few smaller raised yellow spots are scattered over the back, the anterior ones often becoming greenish. Lower surface pale green specked with brown, and with a light median and two black longitudinal lines, corresponding to those above.

West River, with the two preceding,—A. E. Verrill.

This is a very active species. It adheres firmly by means of its posterior sucker, but when much disturbed quickly rolls itself into a ball. One of the specimens, taken June 6th, carried about a dozen slender young ones, of a pale pink color.

In addition to the preceding species, *Clepsine oniscus* Diesing (Blainville sp.) and *Clepsine swampina* Dies. (Bosc sp.) have been indicated from North America. The first has not been described sufficiently to be recognized, all the characters mentioned applying equally to nearly every species of the genus.

*Clepsine swampina* Diesing is thus described. "Body sub-elliptical, depressed, anteriorly narrowed, above transversely sulcated, below plumbeous. Ocelli six, two closely approximate. Acetabulum orbicular. Length 6-7 lines, width 3 lines."

Carolina, upon the surface of tortoises and frogs,—Bosc.

*Liostomum coccineum* Wagler.

Isis, 1831, p. 533; do. 1832, p. 53; Diesing, Sitzungsab. der kais. Akad. der Wissenschaften, xxxiii, p. 495, 1859.

This genus is remarkable in having no ocelli, and no folds, lobes, nor plications within the mouth and oesophagus.

Mexico,—Karwinsky.

*Nephelis quadristriata* Grube.

Famil. des Annel. pp. 110 and 149; Diesing, Sitzungsberichte der kaiserlichen Akad. der Wissenschaften, Math.-Naturwiss. Classe, xxxiii, p. 496, 1859.

Body in extension 2 to 4 inches long by .12 to .25 broad, slender, subterete, tapering to the anterior end; in contraction broader and somewhat depressed posteriorly, the sides rounded. Posterior sucker large, nearly as wide as the body, to which it is broadly attached. Mouth rather large, suborbicular, the upper lip a little expanded, rounded in front, wrinkled within, smooth externally and not distinctly annulated. The œsophagus has the three longitudinal folds slightly prominent, rounded at their exterior ends. Six ocelli were all that could be distinguished; of these those of one pair, situated on the front of the first segment, are much the largest; two pairs of much smaller, inconspicuous ones, are placed well apart on the sides of the buccal segment. Anal orifice large, with a raised border, situated a little in advance of the posterior end of the back.

Color above brownish-black, dark-brown, fuscous, or dark cinereous, with four longitudinal rows of irregular, nearly confluent, black spots, intermingled with light-brown or grayish spots, which often also form the center of the black spots. Lower surface plain brown or fuscous, usually a little lighter than the back.

New Haven and Farmington, Conn.,—A. E. Verrill: Falmouth, Mass.,—Dr. Edw. Palmer. This species is very common in the fresh waters of New England.

*Nephelis lateralis* Verrill.

*Hirudo lateralis* Say, Long's Second Expedition, vol. ii, p. 267, 1824; Diesing, Syst. Helm., vol. i, p. 474.

*Nephelis lateralis* Verrill, this Journal, ii, p. 451, 1871.

The original specimens, described by Say from the waters between Rainy Lake and Lake Superior, were dull livid with "a few very remote minute black points, and a rufous line along each side;" the "six ocular points are placed in a regularly curved line."

A specimen from New Haven appears to belong to the same species. This was 3 or 4 inches long in extension, and .15 to .25 wide; rather slender and subterete anteriorly, somewhat depressed posteriorly, with the margins rounded. Head obtusely rounded in front, not very distinctly annulated. Ocelli six, distinct, with faint indications of another pair on the first segment; the front pair on the first segment are very distinct and much larger than any of the others, well separated, round and blackish; the two pairs on the sides of the buccal segment are very small and well separated. Acetabulum as wide as the body when extended, with a circular row of blackish sub-



marginal spots. The three folds of the œsophagus are about as in the preceding species. The color above is dull dark orange-brown, with numerous fine longitudinal lines, alternately darker and lighter, and with many small irregular black spots scattered unevenly over the surface, except along the middle of the back; an obscure reddish line passes along each side near the margin, apparently due to an internal vessel showing through the integuments. Lower surface plain, dull orange-brown, somewhat lighter than the back. Head light flesh-color, Whitneyville Lake,—A. E. Verrill.

*Nephelis marmorata* Verrill.

*Hirudo marmorata* Say, op. cit., p. 267.

(?) *Nephelis punctata* Leidy, Proc. Acad. Nat. Sci. of Philad., 1870, p. 89.

This species, found by Say associated with the preceding, appears to differ in no important particulars, and may be only a differently colored variety of the same species. It is described as blackish or fuscous, with irregular whitish or light colored spots; beneath pale, generally immaculate, but sometimes with confluent black spots. Ocular points six, in a regularly curved line.

When a larger series of living specimens from various localities can be studied, the three preceding forms, admitted here as species, may prove to be mere varieties of one species, no less variable than the *Nephelis vulgaris* of Europe. The agreement in the number and arrangement of the ocelli is very close in the three forms.

The leech described by Dr. Leidy from the vicinity of Philadelphia, and Beverly, N. J., appears to differ in no essential characters. It was blackish olivaceous above, the annuli minutely punctate with yellowish olivaceous or dusky white, and narrowly bordered with the same; beneath grayish.

*Nephelis fervida* Verrill, described in the December number of this Journal, from Lake Superior, appears to be quite distinct from any of the preceding, judging from the preserved specimens. The eight ocelli are all small and nearly equal. The color when living was bright brick-red, but the preserved specimens show many faint longitudinal lines of brown.

Egg-capsules, apparently of this species, were found in August by Mr. Smith, attached to the leaves of *Nupha*, in a small lake near Simmon's Harbor. These are broad oval or elliptical, above smooth and convex, translucent yellowish brown, with a thin, flat, lighter border, each end prolonged slightly into a short tubular neck, with a terminal orifice. Lower surface flat. Each contained two, three, or more young leeches, mostly upwards of half an inch long, plain whitish, with eight distinct black ocelli. The largest capsule was .45 of

an inch long by .35 wide, including the margin; the smallest was .37 long by .30 wide.

NEPHELOPSIS, gen. nov.

Body broad and flattened behind the clitellus, rounded and tapering in front of it. Upper lip large, dilated, wrinkled and radiately sulcated beneath; œsophagus with three broad folds as in *Nephelis*. Intestine simple, resembling that of *Trocheta*. Ocelli eight in the typical species. External male organ expanded at the end into a disk-like form with a raised margin and depressed center, in which there is a four-lobed orifice as in *Trocheta*. The internal male organs resemble those of *Aulastomum* and *Hirudo*, the testicles being rather large rounded or pyriform vesicles, apparently but eleven on each side.

This genus has a remarkable combination of the characters of *Nephelis*, *Trocheta* and *Aulastomum*. In general habit and form of body it is much like *Trocheta*, but there are no maxillæ.

*Nepheopsis obscura*, sp. nov.

Body much elongated in extension, depressed posteriorly, distinctly annulated, a little rugose anteriorly, in contraction. Length in extension 4 to 5 inches; breadth .25 to .35 of an inch. Head obtusely rounded in front. Ocelli eight; two pairs on the first ring near the front, the inner pair larger, well separated; two pairs on the sides of the buccal segment, small, distant, the upper pair a little below the level of the outer pair of anterior ones. Inner surface of the upper lip very rugose, the sulcations and folds diverging outwardly. Mouth large; folds of the œsophagus broad, prominent, the outer end pointed, triangular. Anal orifice large, with raised borders, on the dorsal surface, a little in advance of the posterior sucker, which is large, rounded, the disk expanded and considerably larger than the pedicle. Clitellus much thickened; male organ short, protruded as a low truncate cone, with disk-shaped end. When examined by transmitted light, a row of eleven rather large translucent, pyriform spots may be seen midway between the dark intestine and the flattened margin, which appeared to correspond with the testicles. Color, above and below, dull, dark brown, umber-brown, or fuscous, usually with numerous obscure, narrow, longitudinal stripes of lighter and darker brown.

Madison, Wisconsin, very abundant in the lakes near the city,—A. E. Verrill.

This species was taken in May, 1870, when numerous egg-capsules were also found attached to the stones along the shores.

*Aulastomum lacustre* Leidy.

Proceedings Acad. Nat. Sciences of Philadelphia, for 1868, p. 229.

This species, well described by Dr. Leidy, has 10 ocelli; eight in the upper lip, the last pair separated by an annulus from

the others. Male aperture in the 24th annulus; female orifice in the 29th. Œsophagus capacious, with twelve folds. "Jaws thin, small, when at rest included in pouches formed by an eversion of the mucus membrane. Teeth 12 in number to each jaw, bilobed at base." Color throughout olive-green, closely maculated everywhere with confluent spots of a darker hue of the same color. A variety was lighter green with fewer spots of black.

Twin Lake, Minnesota, and Lake Superior,—Leidy.

#### SEMISCOLEX Kinberg.

Översigt af Kongl. Vet. Akad. Förhandlingar. xxiii, p. 357, 1867.

According to Kinberg this genus has the following characters: maxillæ wanting; pharynx with a transverse sulcus below the posterior margin of the buccal segment, and below that provided with longitudinal sulci; habit of *Hirudo*.

#### *Semiscolex juvenilis* Kinb., loc. cit.

This, the typical species, has a smooth body with a narrow median dorsal fascia, and a series of spots on each side. Cephalic lobe a little elongated, three-annulate; ocelli eight, with the fourth pair on the second segment of the body; abdominal orifice in the 26th segment; segments 97; length 40<sup>mm</sup>. Montevideo, in fresh-water.

The following species, although evidently allied to *Semiscolex*, differs decidedly in the structure of the cephalic lobe and pharynx, and in having ten ocelli. These characters seem to be of generic value.

#### HEXABDELLA, gen. nov.

Body depressed posteriorly. Cephalic lobe prolonged, composed of four segments, with three longitudinal folds beneath, followed by three transverse fleshy lobes, or folds; below these the Œsophagus is furnished with six longitudinal plications. Ocelli ten; the fourth pair on the buccal segment, the fifth on the second segment behind the buccal. Anus dorsal, at the posterior end of the body. Acetabulum round, separated from the body by a deep constriction.

#### *Hexabdella depressa*, sp. nov.

Body strongly annulated, broad and much flattened posterior to the clitellus, tapering and somewhat rounded in front of it. Length, in partial contraction, 1.50 inches; breadth .40. Head, or cephalic lobe, somewhat elongated, rounded in front, with four annulations, the first or terminal one oval, separated from the following by a decided depression, or fossa. Ocelli ten; the first pair, near together on the posterior edge of the first cephalic segment, the second pair on the second, and the third on the

third segment, form a nearly regularly curved line; those of the fourth pair are on the sides of the fifth or buccal segment; and those of the fifth are on the seventh segment, or the third of the body. Cephalic lobe divided beneath into three broad lobes by two deep sulcations, each lobe subdivided into smaller ones by less marked, divergent grooves. Behind each of the three lobes there is an elevated, transverse, rounded, fleshy lobe or fold; behind these, and separated by a deep groove, there are six well-marked plications in the œsophagus. Anus with elevated, crenulate borders. Male organ between the 24th and 25th segments of the body. Acetabulum round, of moderate size. Color of the preserved specimen, dark slate-brown, above, with few irregularly scattered remote black spots, and with still fewer, small, white specks. Beneath lighter slate-brown, with very few black spots, toward the margins.

Near New Haven,—A. E. Verrill.

DEMOCEDES Kinberg, loc. cit., p. 356.

This genus, according to Kinberg, has "three muscular, compressed, edentate maxillæ," with the habit of *Hirudo*. The two species first named by him are from Port Natal and have 10 ocelli. The remaining species has but 8 ocelli, and is described as follows.

*Democedes maculatus* Kinberg, loc. cit., p. 356.

Body tuberculose, with minute tubercles, cinereous, with irregular black and white spots; cephalic lobe 5- or 6-annulate; ocelli 8; fourth pair on the buccal segment; abdominal orifices in the 25th and 30th segments; segments 94; length 88<sup>mm</sup>.

Wisconsin,—Kumlin.

MACROBDELLA, gen. nov.

Body strongly annulated, stout, broad, depressed throughout, tapering but little. Cephalic lobe large, rounded in front, composed of five segments, its lower surface rugose with longitudinal sulcations, and at the base having a transverse fold, which forms sockets for the protection of the maxillæ, when retracted. Maxillæ three, stout and prominent, the outer edge denticulate, with about 50 to 60 teeth. Nine plications within the œsophagus. Stomach voluminous, divided into several compartments, with very large and irregular dilations or pouches on each side. Ocelli ten. Male orifice between the 26th and 27th\* segments behind the mouth; vulva between the 31st and 32nd. Anal opening dorsal, in advance of the posterior sucker.

This genus has a remarkable combination of the characters of several diverse genera. It has, like *Bdella*, sulcations on the

\* Leidy says that the male orifice perforates the 25th annulus, but he apparently excludes the buccal segment from his count.

cephalic lobe, beneath; maxillæ similar to those of *Hirudo*, but more prominent; a plicated œsophagus, similar to that of *Aulastomum*; a stomach most like that of *Hæmopsis*; internal reproductive organs similar to those of *Hirudo*; while the external male organ is more like that of *Hæmopsis*. The genus differs from all the others, however, in the situation of the genital orifices, in the form of the maxillæ, the number of plications in the œsophagus, etc. It includes one of the stoutest, largest, and most powerful of the leeches hitherto described.

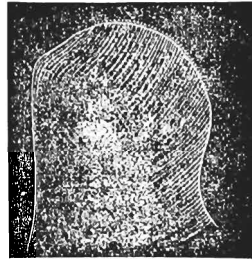
*Macrobdella decora* Verrill. Figure 4; a maxilla.

*Hirudo decora* Say, Long's Second Expedition, vol. ii, p. 268, 1824; Diesing, Systema Helm., i, p. 474; Leidy, Proc. Phil. Acad. Nat. Sci., 1868, p. 230.

Body large, stout, broad, considerably depressed throughout; in extension much elongated and gradually tapering anteriorly, strongly annulated. Length of the larger specimens 12 inches or more; greatest breadth upwards of an inch. Head rounded in front, the cephalic lobe capable of considerable dilation, consisting, apparently, of five segments. Ocelli ten; the first pair between the second and third segments; the second on the third; the third on the fourth; the fourth pair on the sixth or buccal; and the fifth on the ninth segment, or fourth behind the mouth. Cephalic lobe rugose and wrinkled beneath, and with conspicuous longitudinal sulcations, of which three, corresponding with the maxillæ, are deepest; posteriorly with a conspicuous semicircular fold, surrounding and partially concealing the maxillæ, when retracted into their fossæ. Maxillæ thick, very prominent, higher than broad, outer edge rounded in front, and finely and closely denticulate (figure 4). Below each maxilla, in the œsophagus, is a broad plication or fold, which divides into two a short distance beyond; alternating with these are three simple narrower folds, making nine in all. External male organ stout, conical, the broad wrinkled base rising from the 24th to the 30th segments; the terminal portion smoother, with six sulcations; the orifice small, with six lobes. Female orifice also with small lobes, surrounded by a slightly elevated area, formed upon the 31st and 32nd segments; posterior to these there are conspicuous rugose elevations on the 36th and 37th, and on the 38th and 39th segments, with less marked ones on two or three of the previous and following segments; corresponding to these rugosities, there are well developed internal glands.

The reproductive organs are here described from preserved

Fig. 4.  $\frac{2}{1}$



specimens of large size, taken in the breeding season, in spring. At other seasons and in smaller specimens, these characters are not so obvious. Acetabulum large, separated from the body by a well-marked constriction.

Color above, dark livid brown, or olive-green, with a median dorsal row of about 20 to 22 bright or pale red spots, which are sometimes obsolete, and a row of rounded black spots near each margin, corresponding in number and nearly in size with the red ones. Lower surface bright or dark orange-red, or reddish brown, sometimes with black spots near the margins.

Vermilion River,—Say; Norway, Maine; in many lakes and streams in other parts of Maine; and in streams and ponds near New Haven,—A. E. Verrill; Minnesota,—Dr. Leidy.

This species is very common and widely diffused in the freshwaters of the northern United States. Its range northward and southward is unknown. It is the only true blood-sucking leech known to me from the Atlantic States. It is capable of drawing blood from the human skin, but ordinarily subsists upon frogs and tadpoles. It often attaches itself to the throat, and speedily kills them, even when of large size. It is frequently used instead of the imported leeches by physicians, and is equally efficacious.

The following species, which I have not seen, have been described from North America:

*Hirudo ornata* Ebrard, Nouv. Monog. Sangs., p. 55. Northwestern America.

*Hirudo* (?) *Costaricensis* Grube and Ers.; Diesing, op. cit., p. 509. Costa Rica,—Erssted.

*Hirudo Billberghi* Kinberg, op. cit., p. 356, 1867. Montevideo. This species is described as having eight ocelli, with the genital orifice in the 28th segment. It probably belongs to some other genus.

*Oxytychus striatus* Grube, Fam. d'Annel., p. 110, 148; Diesing, op. cit., p. 510. Montevideo,—Burmeister.

*Centropygus Jocensis* Grube and Ers., 1857; Dies., op. cit., p. 511. St. Joce, Central America,—Erssted.