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RESULTS OF THE AUSTRIAN-CEYLONESE HYDROBIOLOGICAL MISSION 1970 OF THE 1ST ZOOLOGICAL INSTITUTE OF THE UNIVERSITY OF VIENNA (AUSTRIA) AND THE DEPARTMENT OF ZOOLOGY OF THE VIDYALANKARA UNIVERSITY OF CEYLON, KELANIYA

# Part XVIII : Freshwater Mussels Bivalvia

by

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*(With 1 plate—Plate XVII)*

*Introduction*

Till now there have been only two families of Bivalves with four genera known from freshwaters in Ceylon (Mendis and Fernando 1962). The material used for this study consists of members of three genera.

This study deals mainly with the family Unionidae, the family Corbiculidae is only represented by one specimen.

*Acknowledgements*

The author is very much indebted to Professors H.H. Costa and F. Starmühlner and to the members of the Swedishi Lund University Expedition 1962 to Ceylon (Prof. Dr. P. Brinck, Dr. H. Andersson and Dr. L. Cederholm for the material they collected and to Mrs. M. Mizzarro for making the photographs.

*Material and Method.*

Bivalves were obtained from 6 stations. (Fig. 1). Exact data was received from two stations of the Austrian-Ceylonese Hydrobiological mission 1970 where only empty shells were collected. The data are as follows :—

FC 27 : 9.12.1970 : Kuda-Oya, near Buttala in the South-east of Ceylon, running through forest and very heavy shade (Fig 22).

| | | | |
|---|---|---|---|
| Alt. | : 150m | Che. : pH | : 7'7. |
| Br. | : 10-15m. | $El_{20}$ | : 295 $\mu$ Siemens |
| D. | : 20 cm.-1m. | Tot.H. | : 9'2°dH |
| Curr. | : 30 cm./sec. (on small cascades : lm/ sec.) | Alk. | : 3'55 mval. |
| | | CaO | : 52mg./l |
| Gr. | : gravel, sand between some rocks | MgO | : 28'9mg./l |
| | | $SiO_2$ | : 28'8mg./l |
| Te. | : 25'5° C(11$^h$) | Cl | : 7'1mg./l |
| | | $NO_3$ | : 0'108mg./l |
| | | $NH_4$ | : 0'02mg./l |
| | | $P_2O_5$ | : 0'11mg./l |

(*Abbrevations :* Alt. : Altitude (in m.), Br. : Breadth (in cm. or m.), D. : Depth (in cm. or m.), Curr. : Current (in m/sec.) ; Gr. : Ground ; Te. : Termperature (in ° Celsius) ; Che. : Chemistry ; Tot. H. : Total Hardness (in ° dH=German Hardness degree, 1° dH=1'25° English Hardness degree= 1'79° French Hardness degree) ; Alk. : Alkalinity ; $El_{20}$ $\mu$ : Conductivity (in $\mu$ Siemens, Temperature : 20° C) ; CaO : Calcium ; MgO : Magnesium ; $SiO_2$ : Silicate ; Cl : Chloride ; $NO_3$ : Nitrate ; $NH_4$ : Ammonium ; $P_2O_5$ : Phosphate.).

(Data according to COSTA and STARMÜHLNER, 1972)

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FC 32 : 15.12.1970 : Small stream in a forest, crossing the road between Habarane and Dambulla in the west of Polonnaruwa, shady.

Br. : 1'5-3m
D. : 10-50cm.
Curr.: 30cm/sec
Gr. : sand, on the border of the stream are roots hanging and floating in the current
Te. : 25'5°C ($18^h$)

Che. : pH : 7'25
$El_{20}$ : 605$\mu$ Siemens
Tot.H.: 12'9-dH
Alk. : 1'6mval
CaO : 50'9 mg/1
MgO : 56mg./1
$SiO_2$ : 15mg./1
Cl. : 145'6mg/1
$NO_3$ : 0'081mg/1
$NH_4$ : 0'22mg/1
$P_2O_5$ : 0'18mg/1

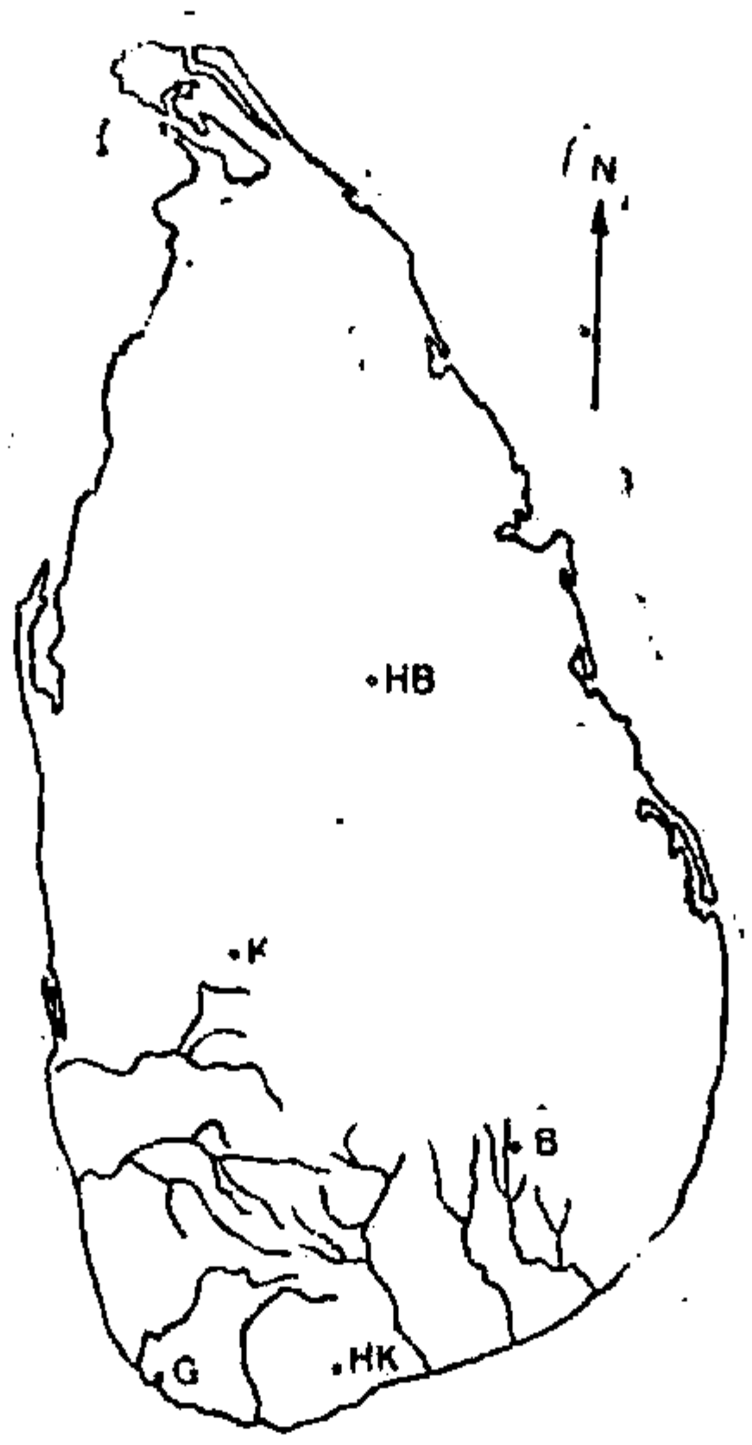


Fig. 1. Map of Ceylon showing collecting stations. B. Buttala, G. Galle, HB. Habarana, K. Kegalle (Modified from Costa and Starmühlner 1972)

Four species from 3 genera are recorded.

All bivalves were measured. The relationship of measurements and regression lines were calculated for two species.

Anatomical studies shall follow in a further contribution.

*Recorded Species :*

Unionidae

*Lamellidens lamellatus* (LEA) 1838
*Lamellidens testudinarius* (SPENGLER) 1793
*Parreysia corrugata* (MÜLLER) 1774

Corbiculidae

*Polymesoda ceylonica* (CHEMNITZ) 1782

*Lamellidens lamellatus* (LEA) 1838 (Fig. 2, plate XVII)

1838 *Unio lamellatus* LEA Terra typica Bengalen

1858 *Unio layardii* LEA, Terra typica Ceylon

Diagnosis : Shell irregular, egg-shaped, thin-shelled, ventricose, anteriorly it is narrow and rounded, the posterior dorsal margin is nearly straight. The area is wrinkled and its two ridges are weak. The shell surface is smooth of an olive to brown colour, sometimes with brighter yellow stripes. The umbo is weak and covered with small wrinkles. The cardinal teeth of the left valve are thin, incisive, partially fused together, seperated only by a poorly developed crease. Right valve with one cardinal tooth and, parallel to it an accessory tooth. Lateral teeth long, straight to slightly curved. Mother of pearl blue.

Localities

Kegalle, 21 specimens

Jungle brook near Habarane, west of Polonnaruwa (FC 32), 8 empty shells.

Kuda-Oya, near Buttala (FC 27), 1 empty shell.

Measurements are given for the three largest specimens recorded for each locality.

| | *Length* mm. | *Height* mm. | *Breadth* mm. |
|---|---|---|---|
| Kegalle | 53,3 | 31,5 | 15,0 |
| | 43,3 | 25,4 | 13,0 |
| | 41,3 | 23,7 | 12,6 |
| Habarane | 63,0 | 31,3 | 21,2 |
| | 52,4 | 30,4 | 17,0 |
| | 48,8 | 28,0 | 15,2 |
| Kuda-Oya | 71,8 | 39,3 | 22,3 |

Distribution : India, Ceylon.

Size-distribution of Population :

Because of the relatively large number of specimens from Kegalle (21), an analysis of their size-distribution has been ventured. The specimens were between 16.1 and 53,3 mm long. The maximum lies between 30 and 35mm. Smaller stages are missing, probably as a result of the collecting methods. Collections convering all seasons would be necessary in order to make an exact analysis of the structure of the population as well as to determine the time and length of reproduction.

Morphometry :

The height and breadth of each mussel is set in relation to its length and entered into a diagram. Circles indicate the animals from Kegalle, triangles those from Habarane. The latter values are not included in the calculations. They only serve to compare the two populations. The Habarane population compares well with that from Kegalle.

The points are situated very close to the regression line and show no significant deviation of measurement and their relations.

The regressions were calculated with a Hewlett Parker computer and were entered into the diagrams.

The coefficients of corelation (0,9700 and 0, 9752) show a high correlation of the values.

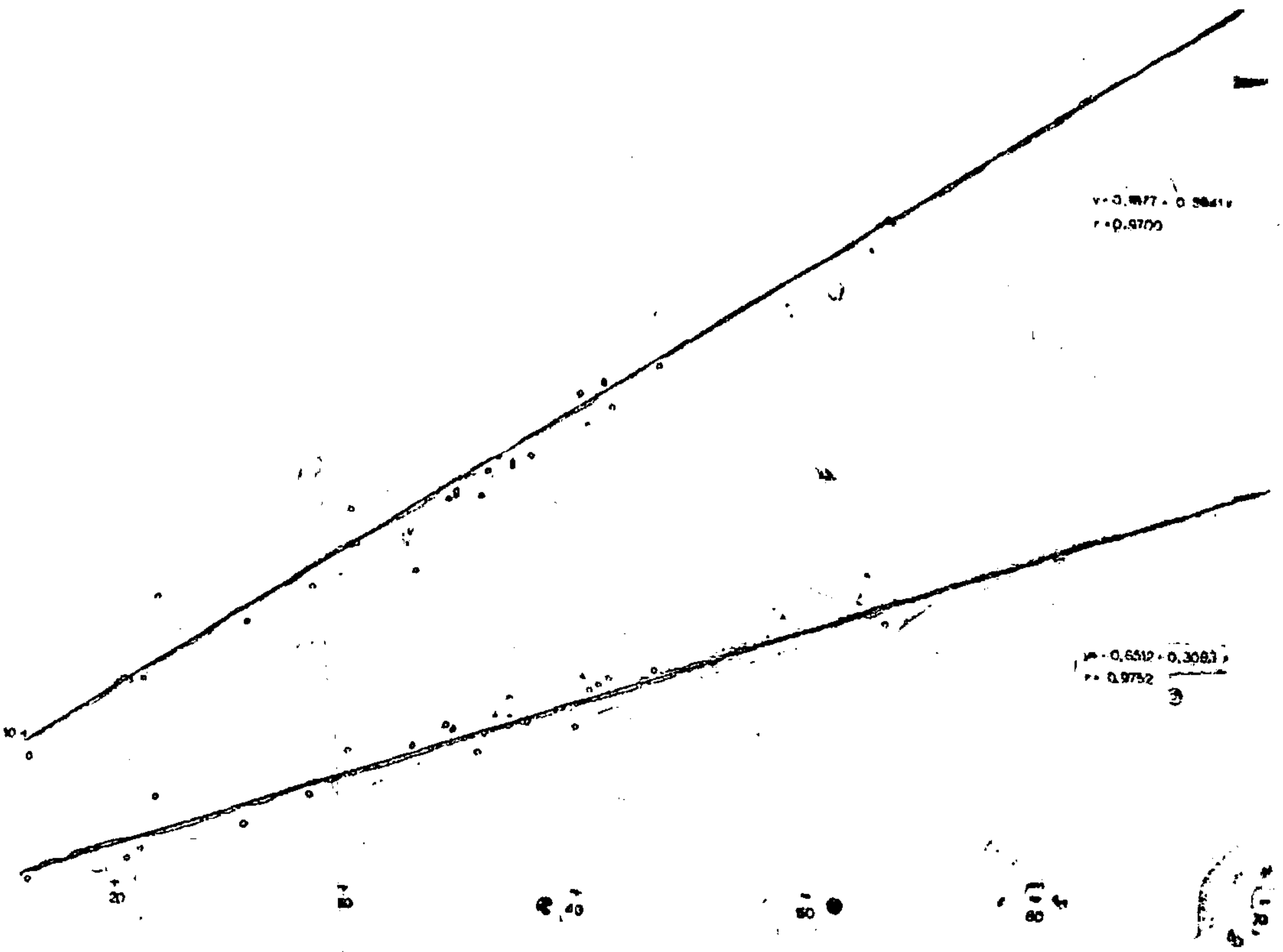

Fig. 3. Relation between length (x-axis) and height (upper line) and breadth (lower line) by *Lamellidens lamellatus*. Circles indicate animals for Kegalle, Triangles indicate animals from Habarana.

*Lamellidens testudinarius* (SPENGLER) 1793 (Fig. 4, Plate XVII)

1793 *Unio testudinarius* SPENGLER

1793 *Unio truncatus* SPENGLER

1819 *Unio marginalis* LAMARCK

1859 *Unio thwaitesii* LEA

1860 *Unio consobrinus* LEA

1892 *Unio corbei* DESCHAMPS

*Diagnosis*. Shell irregular, egg-shaped, relatively strong, ventricose, rounded anteriorly, posterior dorsal margin slightly rounded, area with two area ridges, posterior end with a rostrum. Surface of the shell smoth of a brownish colour with numerous raised growth rings. Umbo weak, strongly corroded, rough, the posterior one smooth. Right valve with one cardinal tooth and, parallel to it, an accesory tooth. Lateral teeth long, straight, mother of pearl bluish, salmon-pink in the umbo-fold.

| | *L* | *H* | *B* |
|---|---|---|---|
| | *mm.* | *mm.* | *mm.* |
| Hakmana, 2 specimens .. | 56,2 .. | 30,7 .. | 19,1 |
| | 55,4 .. | 30,6 .. | 20,0 |

*Distribution*. Ceylon, India, Burma.

*Parreysia corrugata* (MÜLLER) 1774 (Fig. 5, Plate XVII)

1774 *Mya corrugata* MÜLLER

*Diagnosis.* Shell thick-set, irregularly egg-shaped, relatively compact, anterior margin runs to a point in its lower third part, posterior brim regularly rounded, merging into the lower brim, area with one area ridge and 2 parallel dark lines, shell with smooth surface, except for low rough ridges on the brims due to folds of the periostracum. Umbo prominent, its peak mostly corroded, young animals have distinct zig-zag pattern, ligament prominent, cardinal teeth of left valve strong, small, parallely curved, clear imprints of shell adductors, frontal adductor inserting into a groove.

Localities

Kegalle, 71 specimens

Batalagoda, 1 specimen

| | *L* *mm.* | *H* *mm.* | *B* *mm.* |
|---|---|---|---|
| Kegalle .. .. | 48.9 .. | 34.1 .. | 21.5 |
| | 43.7 .. | 30.3 .. | 19.2 |
| | 41.1 .. | 30.0 .. | 19.1 |
| Batalagoda .. .. | 32.3 .. | 21.5 .. | 18.5 |

*Distribution.* Bengal, Deccan, Ceylon.

Size distribution of population :

71 specimens of *Parreysia corrugata* were found in Kegalle. The smallest individual is 9. 6mm. the largest 48. 9mm in length. The population's maximum lies between 20 and 25 mm in length. The number of representatives of the different size-classes approaches normality in its distribution.

**Morphometry**

**As with *Lamellidens lamellatus* the height and breadth of the mussels are set into relation to its length and the results are presented graphically.**

**The relationship of the measurements agrees well with their correlation coefficient of 0. 9954 and 0.9900. During their growth *Lamellidens lamellatus* and both *Parreysia corrugata* show a constancy of their proportions. Early youth stages are missing, but probably do not influence the result . The proportions can be concluded from the rise of the regression line. Ventricose and compact species show a steeper rise in comparison to the slimmer species.**

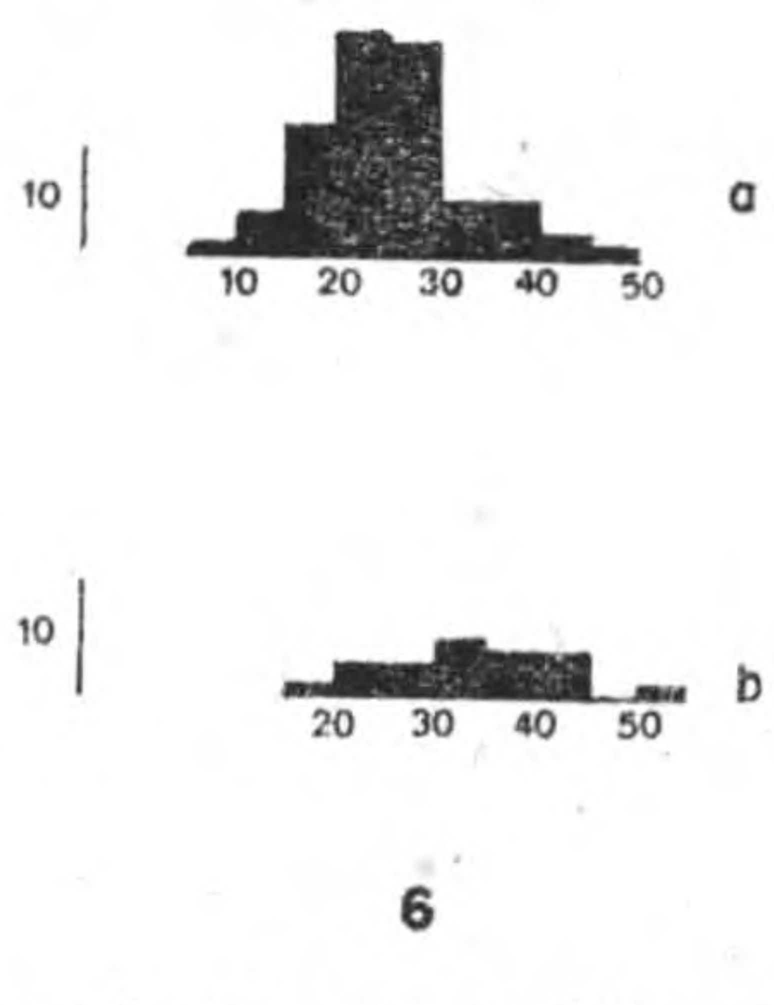


**Fig. 6. Size frequency diagram for the animals of Kegalle. a. *Parreysia corrugata*, mean length $\times$ =25.9 mm. No. of Specimens 71. b. *Lamellidens lamellatus*, means length $\times$ =33.3 mm. No. of specimens 21.**

The study of different populations of one species as well as comparison of populations of related species could be a valuable contribution to the taxonomy of these in part little known species.

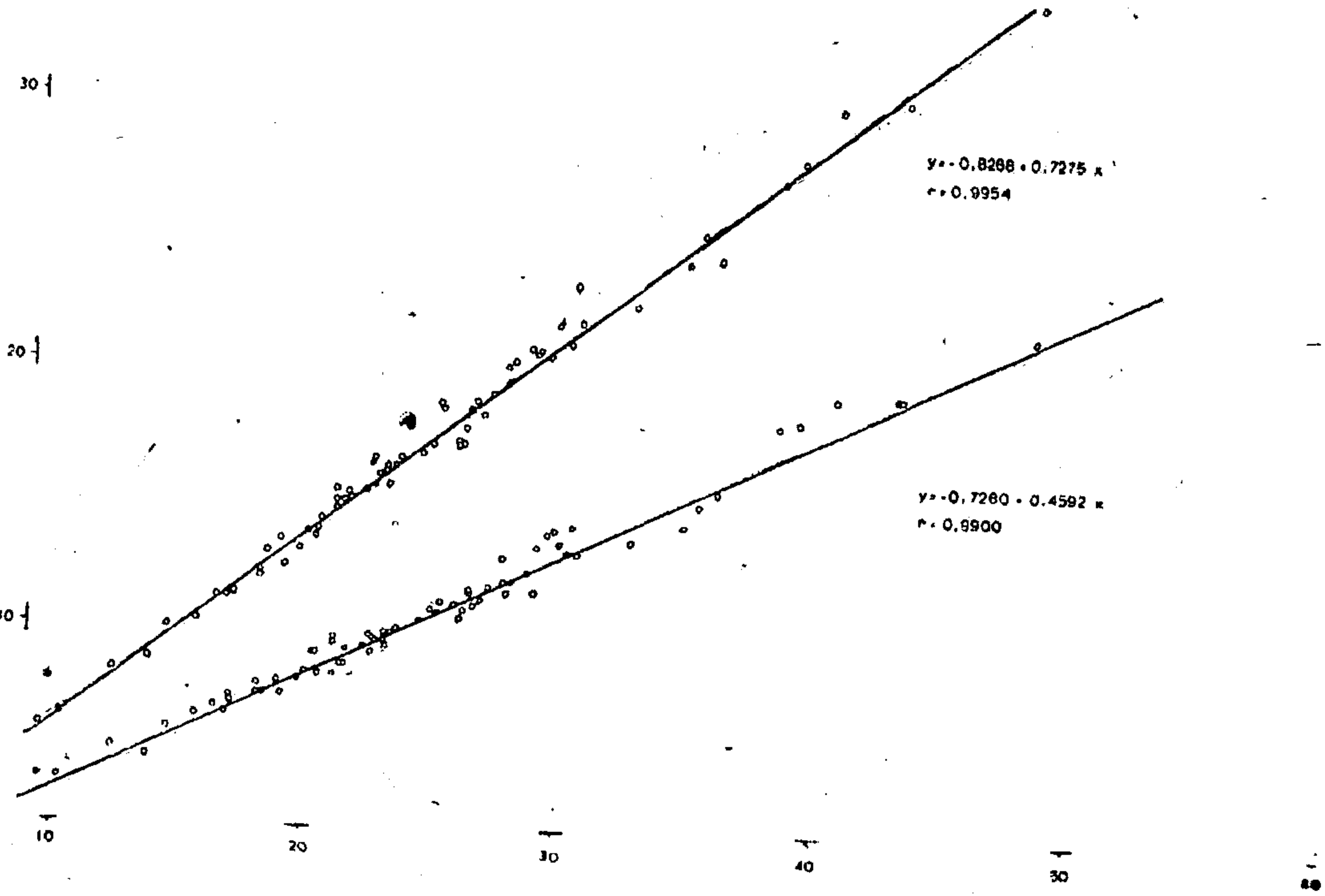


Fig. 7. Relation between length and height (upper line) and breadth (lower line) in *Parreysia corrugata* from Kegalle (71 specimens).

*Polymesoda ceylonica* (CHEMNITZ) 1782 (Fig. 8, Plate XVII)

1782 *Venus ceylonica* CHEMNITZ

1086 *Cyclas zeylanica* LAMARCK

1818 *Cyrena zeylanica* LAMARCK

*Diagnosis*. Shell rounded, thick, height and length equal ; surface brown, smooth between folds of periostracum umboes projecting from the nearly circular form, strongly corroded, hinge teeth normally developed.

| | | L | | H | | B |
|---|---|---|---|---|---|---|
| | | *mm.* | | *mm.* | | *mm.* |
| Galle, one empty shell | .. | 81.5 | .. | 75.0 | .. | 40.5 |

*Distribution :* Ceylon. Other Indo-Pacific species of *Polymesoda* possibly fall into the breadth of variation of *Polymesoda ceylonica*. Larger numbers of specimens would be necessary to classify the relationship of these species.

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# EXPLANATIONS TO PLATES

PLATE I—COSTA—HORTON PLAINS STREAM—pp. 15-24

A-Station I—note the extensive sitting

B-Station II—in the background are potato fields

C-Station III

D-Station IV

E-The Stream just after Stations VII

E-A Trout caught from the Stream

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PLATES II to XVI—STARMÜHLNER—FRESHWATER GASTROPODS—pp. 97-181

PLATE II—Fig. 2 : *Neritina* (*Neripteron*) *auriculata* ; Juvenile shell (from size below length 12 mm.) and adult shell (from size above length : 17.8 mm.) both from No. 10 (Kelaniya).

Fig. 3 : *Neritina* (*Neripteron*) *auriculata* ; 2 shells from No. 3 (Ambalangoda; length 13 mm.)

Fig. 4 : *Neritina* (*Neripteron*) *auriculata* ; 2 shells from No. 11 (Horana ; length 12 mm.)

Fig. 9 : *Septaria lineata* ; soft body (at left) and shell from above, from No. 3 (Ambalangoda ; length 20.5 mm.)

Fig. 10 : *Septaria lineata* ; shell and foot from below (at left) and shell from above, from No. 3 (Ambalangoda ; length 16.9 mm.)

Fig. 11 : *Septaria lineata* ; shell and foot with snout and tentacles from below and shell from above, from No. 11 (Horana ; length 15.1 mm.)

Fig. 12 : *Septaria lineata* ; shells from below and above, from No. 11 (Horana ; length 14.3 mm.)

Fig. 13 : *Septaria lineata* ; shells from below and above, from No. 12 (Tholangamuwa)—var. *compressa* ; Length : 11.1 mm.

Fig. 17 : *Bellamya dissimilis* var. *ceylanica* ; shells from No. 75 (Parakrama tank ; Alt : 26 mm '

PLATE III—Fig. 18 : *Bellamya dissimilis* var. *ceylanica* ; exterior of operculum ; Alt : 11 mm.

Fig. 19 : *Bellamya dissimilis* var. *ceylanica* ; interior of operculum ; Alt : 11 mm.

Fig. 32 : *Tricula montana* ; shell from No. 53 (Madugoda ; Alt : 3 mm.)

Fig. 33 : *Gangetia burmanica* ; shell from No. 99 (Nay Aru. Ht. 2.8 mm.)

Fig. 37 : *Bulimus inconspicua* ; shell from No. 80 (Maha Bulankulama : Alt. : 5.3 mm.)

Fig. 38 : *Bulimus inconspicua* ; shell from No. 90 (Puttalam ; Alt. : 5 mm.)

PLATE IV—Fig. 25 : *Pila globosa* ; shell of var. *carinata* from No. 20 (Ja-Ela ; Alt. 50 : mm.)

Fig. 26 : *Pila globosa* ; shell of var. *layardi* from No. 10 (Kelaniya ; Alt. : 44.6 mm.)

Fig. 27 : *Pila globosa* ; shell of var. *tischbeini* from No. 10 (Kelaniya ; Alt. : 33 mm.)

Fig. 28 : *Pila globosa* ; exterior of operculum of var. *layardi* (fig. 26).

Fig. 29 : *Pila globosa* ; interior of operculum of var. *layardi* (fig. 26)

Fig. 30 : *Pila globosa* ; interior and exterior of operculum of var. *tischbeini* (fig. 27)

PLATE V—Fig. 40 : *Bulimus stenothyroides* ; shell from No. 33 (We Ganga ; Alt. : 6.6 mm.)

Fig. 45 : *Mysorella costigera* ; shell from No. 9 (Wirawila ; Alt. : 7.3 mm.)

Fig. 48 : *Syncera* (=*Assiminea*) cf. *hidalgoi* ; shell from No. 99 (Nay Aru ; Alt. : 2.5 mm.)

Fig. 51 : *Syncera* (=*Assiminea*) cf. *woodmasoniana* ; shell of No. 99 (Nay Aru ; Alt. : 3.2 mm.)

Fig. 61 : *Paludomus* (*Paludomus*) *chilinoides* ; 2 full grown shells with eroded apex from No. 50 (Peradeniya ; Alt. : 18-24 mm.)

Fig. 62 : *Paludomus* (*Paludomus*) *chilinoides* ; the same shells like fig. 61, backside ; Alt. : 18-24 mm.

Fig. 63 : *Paludomus* (*Paludomus*) *chilinoides* ; 3 inadult shells from No. 50 (Peradeniya) with different markings ; Alt. : 12-15 mm.

PLATE VI—Fig. 56 : *Fanus ater* ; 3 shells of the var. *perdecollata* from No. 3 (Ambalangoda ; Alt. : 65-69 mm.)

Fig. 57 : *Fanus ater* ; shell from No. 87 (Kadaimparu ; Alt : 66 mm.)

Fig. 58 : *Fanus ater* ; exterior of operculum from var. *perdecollata*.

Fig. 64 : *Paludomus* (*Paludomus*) *chilinoides* ; 4 small inadult shells from No. 50 (Peradeniya) with varying markings ; Alt. : 6-15 mm.

Fig. 65 : *Paludomus* (*Paludomus*) *chilinoides* ; interior and exterior of operculum.

PLATE VII—Fig. 66 : *Paludomus* (*Paludomus*) *chilinoides* ; food, snout, tentacles and fringed mantle edge (Alt. 24 mm.)

Fig. 67 : *Paludomus* (*Paludomus*) *chilinoides* ; female (left : 23 mm.) and male (right : 21 mm.)

Fig. 77 : *Paludomus* (*Paludomus*) *chilinoides* ; copulation (Alt. : 23 mm.)

PLATE VIII—Fig. 78 : *Paludomus (Paludomus) inflatus* ; shell from No. 71 (Rambukkan Oya ; Alt. : 11.6 mm.)

Fig. 79 : *Paludomus (Paludomus) palustris* ; shell from No. 100 (Ceylon, without any describe( locality ; Alt. : 15.2 mm.)

Fig. 80 : *Paludomus (Paludomus) transchauricus* ; shell from No. 73 (Anuradhapura ; Alt. : 15 mm.)

Fig. 81 : *Paludomus (Paludomus) transchauricus* subspec. *nasutus* ; shell from No. 61 (Wetakei Ela ; Alt. : 15 mm.)

Fig. 82 : *Paludomus (Philopotamis) bicinctus* ; shell from No. 54 (E of Kandy, Art. : 17.5 mm.)

Fig. 83 : *Paludomus (Philopotamis) decussatus* ; 2 shells from No. 66 (Yalakumbura ; Alt. : 14.2 mm.)

Fig. 84 : *Paludomus (Philopotamis) nigricans* ; 2 shells from No. 46 (Hakgala, Alt. : 13.2 mm.)

Fig. 88 : *Paludomus (Philopotamis) regalis* ; juvenile shell from No. 7 (Haycock Mountain ; Alt. : 8.5 mm.)

PLATE IX—Fig. 89 : *Paludomus (Philoptamis) sulcatus* ; shell from No. 26 (Rajanawa Dola ; Alt. : 22 mm.)

Fig. 92 : *Paludomus (Tanalia) loricatus* ; shell of var. *typica* (*loricatus* s. str.) from No. 24 (Bodathpitiya Ela ; Alt. : 41 mm.)

Fig. 93 : *Paludomus (Tanalia) loricatus* ; shell of var. *typica* (*loricatus* s. str.) from No. 26 (Rajanawa Dola ; Alt. : 33.5 mm.)

Fig. 94 : *Paludomus (Tanalia) loricatus* ; juvenile shell of var. *erinaceus* from No. 40 (Gilimale ; Alt. : 25 mm.)

Fig. 95 : *Paludomus (Tanalia) loricatus* ; the same shell like fig. 94, backside ; Alt. : 25 mm.)

Fig. 96 : *Paludomus (Tanalia) loricaus* ; shell of var. *erinaceus* from No. 27 (Kalu Ganga near Ratnapura ; Alt. : 43 mm.)

Fig. 97 : *Paludomus (Tanalia) loricatus* ; shell of a transition between var. *typica* (*loricatus* s. str.) and var. *erinaceus* from No. 28 (upper branches of Kalu Ganga ; Alt. : 40.2 mm.)

Fig. 98 : *Paludomus (Tanalia) loricatus* ; shell of var. *funiculatus* from No. 35 (Kelani Ganga, near Kitulgala ; Alt. : 33.8 mm.)

Fig. 99 : *Paludomus (Tanalia) loricatus* ; the same shell like fig. 98, backside ; Alt. : 33.8 mm.)

PLATE X—Fig. 100 : *Paludomus (Tanalia) loricatus* ; young and full grown shell of var. *funiculatus* from No. 32 (Kirikatu Oya ; Alt : 18, 28.8 mm.)

Fig. 101 : *Paludomus (Tanalia) loricatus* ; shell of a transition between var. *funiculatus* and var. *pictus* from No. 1 (Thanipita Dola ; Alt. : 28.4 mm.)

Fig. 102 : *Paludomus (Tanalia) loricatus* ; shell of var. *pictus* from No. 38 (Rakwana ; Alt. : 19.1 mm.)

Fig. 103 : *Paludomus (Tanalia) loricatus* ; the same shell like fig. 102, backside ; Alt. : 19.1 mm.)

Fig. 104 : *Paludomus (Tanalia) loricatus* ; shell of var. *pictus* from No. 30 (Ira Handha Pana Dola ; Alt. : 30.8 mm.)

Fig. 107 : *Paludomus (Tantalia) neritoides* ; shell of a transition between var. *tennanti* and var. *gardneri* from No. 24 (Bodathpitiya Ela ; Alt. : 25.4 mm.)

Fig. 108 : *Paludomus (Tanalia) neritoides* ; 2 shells of var. *typica* (*neritoides* s. str.) from No. 26 (Rajanawa Dola ; Alt. : 22 mm.)

Fig. 109 : *Paludomus (Tanalia) neritoides* ; the same shells like in fig. 108, backside ; Alt. : 22 mm.)

Fig. 110 : *Paludomus (Tanalia) neritoides* ; shell of var. *gardneri* from No. 27 (Kalu Ganga ; Alt. : 32.7 mm.)

PLATE XI—Fig. 111 : *Paludomus (Tanalia) neritoides* ; the same shell like in fig. 110, backside ; Alt. : 32.7 mm.)

Fig. 112 : *Paludomus (Tanalia) neritoides* ; shell of var. *gardneri* from No. 28 (Malwala ; Alt. : 35.5 mm.)

Fig. 113 : *Paludomus (Tanalia) neritoides* ; the same shell like fig. 112, backside ; Alt. : 35.5 mm.)

Fig. 114 : *Paludomus (Tanalia) neritoides* ; shell of var. *typica* (*neritoides* s. str.) from No. 29 (Carney ; Alt. : 24 mm.)

Fig. 115 : *Paludomus (Tanalia) neritoides* ; 2 shells of transition stages between var. *typica* (*neritoides* s. str.) and var. *dilatatus* from No. 33 (We Ganga ; Alt. : 27 mm.)

Fig. 116 : *Paludomus (Tanalia) neritoides* ; the same shells like in fig. 115, backside ; Alt. : 27 mm.)

PLATE XI—Fig. 117 : *Paludomus (Tanalia) neritoides* ; 2 not full grown shells of var. *typica* (*neritoides* s. str.) from the same population like in fig. 115, 116 (No. 33—We Ganga Alt. : 20 mm.)

Fig. 118 : *Paludomus (Tanalia) neritoides* ; the same shells like in fig. 117, backside ; Alt. : 20 mm.

Fig. 119 : *Paludomus (Tanalia) neritoides* ; shell of a transition between var. *tennanti* and var. *typica* (*neritoides* s. str.) from No. 35 (Kelani Ganga ; Alt. : 28.2 mm.)

Fig. 120 : *Paludomus (Tantalia) neritoides* ; the shell like in fig. 119, backside ; Alt. : 28.2 mm.

PLATE XII—Fig. 121 : *Paludomus (Tanalia) neritoides* ; 2 shells of transitions between var. *typica* (*neritoides* s. str.) and var. *dilatatus* from No. 47 (Hal Oya ; Alt. : 23 mm.)

Fig. 122 : *Paludomus (Tanalia) neritoides* ; the same shells like in fig. 121, backside ; Alt. : 23 mm.

Fig. 123 : *Paludomus (Tanalia) neritoides* ; 3 immature shells of transition forms between var. *typica* (*neritoides* s. str.) and var. *dilatatus* from the same population like fig. 121, 122 (No. 47-Hale Oya ; Alt. : 10-15 mm.)

Fig. 124 : *Palidomus (Tanalia) neritoides* ; the same shells like in fig. 123, backside ; Alt. : 10.15 mm.

Fig. 125 : *Palusomus (Tanalia) neritoides* ; 3 shells of transition forms between var. *typica* (*neritoides* s. str.) and var. *dilatatus* from No. 48 (Rambukpoth Oya ; Alt. : 23.3 mm.)

Fig. 143 : *Paludomus (Tanalia) solidus* ; 3 shells from No. 61 (Wetakei Ela ; Alt : 18-20.7 mm.)

Fig. 144 : *Paludomus (Tanalia) solidus* ; the same shells like in fig. 143, backside ; Alt. : 18-120.7 mm.

PLATE XIII—Fig. 129 : *Paludomus (Tanalia) neritoides* ; cross section through the upper whorl of a female : on the outside. the tubuli of the ovary covering the tubuli of the digestive gland ; ova : ovary, dg : digestive gland.

Fig. 130 : *Paludomus (Tanalia) neritoides* ; cross section through the upper part of the uterine wall with the subepithelial gland masses of the albumen gland, opening between the ciliated epithel of the uterus ; agl : gland masses of the subepithelial albumen gland, ep : ciliated epithel, lining the cavity of the uterus.

Fig. 131 : *Paludomus (Tanalia) neritoides* ; cross section through the uterus with subepithelial albumen gland and capsule gland and through the receptaculum seminis ; agl : albumen gland, cgl : capsule gland, ov : oviduct, rs : receptaculum seminis, ut : cavity of the uterus.

Fig. 132 : *Paludomus (Tanalia) neritoides* ; cross section like in fig. 131, but in a lower region with the, opening of the receptaculum seminis in a ciliated furrow guarded by a flap ; abbrevations like in fig. 131 and fl : flap.

Fig. 133 : *Paludomus (Tanalia) neritoides* ; cross section like in the figures 131 and 132, but in a lower part of the uterus ; abbrevations like in fig. 131, 132.

Fig. 134 : *Paludomus (Tanalia) neritoides* ; cross section like in the figs. 131, 132, 133, but near the mantle edge with the opening of the vagina, guarded by a flap ; vag : opening of the vagina in the ciliated furrow, fl : flap.

PLATE XIV—Fig. 135 : *Paludomus (Tanalia) neritoides* ; cross section through the upper whorl of a male, the tubuli of the testis surrounding the tubuli of the digestive gland ; te : testis, dgl : digestive gland.

Fig. 136 : *Paludomus (Tanalia) neritoides* ; cross section like in fig. 135 by higher enlargement ; abbrevations like in fig. 135.

Fig. 137 : *Paludomus (Tanalia) neritoides* ; cross section through the glandular seminal vesicle ; cm : columellar muscle, sv : seminal vesicle (glandular).

Fig. 138 : *Paludomus (Tanalia) neritoides* ; cross section through the glandular seminal vesicle by higher enlargement ; ciliated and glandular epithelium.

Fig. 139 : *Paludomus (Tanalia) neritoides* ; cross section through the opening of the seminal vesicle in a ciliated seminal furrow, guarded by a flap ; cm : columellar muscle, fl : flap, sv : seminal vesicle, r : rectum.

Fig. 140 : *Paludomus (Tanalia) neritoides* ; cross section like in fig. 139, but in a lower part, abbrevations like in fig. 139 and ci fu : ciliated seminal furrow.

Fig. 141 : *Paludomus (Tanalia) neritoides* ; cross section like fig. 139, 140, but near the mantle edge ; abbrevations like figs. 139, 140 and pe : penis.

Fig. 142 : *Paludomus (Tanalia) neritoides* ; cross section through the penis before its opening near the mantle edge, higher enlargement than in figure 137-141 ; pe : penis, r : rectum.

PLATE XV—Fig. 146 : *Thiara (Plotia) scabra* ; 3 shells from No. 36 (Kegalle ; Alt. : 15–19.6 mm.)

Fig. 150 : *Melanoides (Melanoides) tuberculata* ; 3 shells from No. 5 (Matara ; Alt. : 14–16.5 mm.)

Fig. 151 : *Melanoides (Melanoides) tuberculata* ; 4 shells from No. 33 (We Ganga, Alt. : 24–24.8 mm.)

Fig. 152 : *Melanoides (Melanoides) tuberculata* ; 3 shells from the No. 36 (Kegalle, Alt. : 23–24.5 mm.)

Fig. 153 : *Melanoides (Melanoides) tuberculata* ; 3 shells from the No. 49 (Kandy ; Alt. : 28–29.5 mm.)

Fig. 154 : (Marked 165 in Plates) *Radix (Cerasina) luteola* var. *pinguis* ; 2 shells from No. 19 (Panadura; Alt. : 16–18 mm.)

PLATE XVI—Fig. 164 : *Indoplanorbis exustus* ; 2 shells from No. 49 (Kandy ; Diam : (15.7 mm.)

Fig. 165 : *Indoplanorbis exustus* ; shell with aperture from No. 49 (Kandy ; Alt. : 7 mm.)

Fig. 171 : *Gyraulus convexiusculus* ; 2 shells of the var. *typica* from No. 8 (Yoda Wewa ; Diam. : 6 mm.)

Fig. 172 : *Gyraulus convexiusculus* ; shell of the var. *compressus* from No. 76 (Wilpattu ; Diam. : 3.8 mm.)

Fig. 173 : *Gyraulus convexiusculus* ; 2 shells of the var. *compressus* from 91 (Puttalam ; Diam. : 3.5 mm.)

PLATE XVII—HADL—FRESHWATER MUSSELS, pp. 183–188

Fig. 2 : *Lamellidens lamellatus* (LEA), a. Outside ; b. Inner side of left valve

Fig. 4 : *Lamellidens testudinarius* (SPENGLER) a. Outside ; b. Inner side of left valve

Fig. 5 : *Parreysia corrugata* (MÜLLER) ; a. Outside of left valve ; b. Inner side of both valves

Fig. 8 : *Polymesoda ceylonica* (CHEMNITZ) ; a. Outside of left valve ; b. Hinge of both valves

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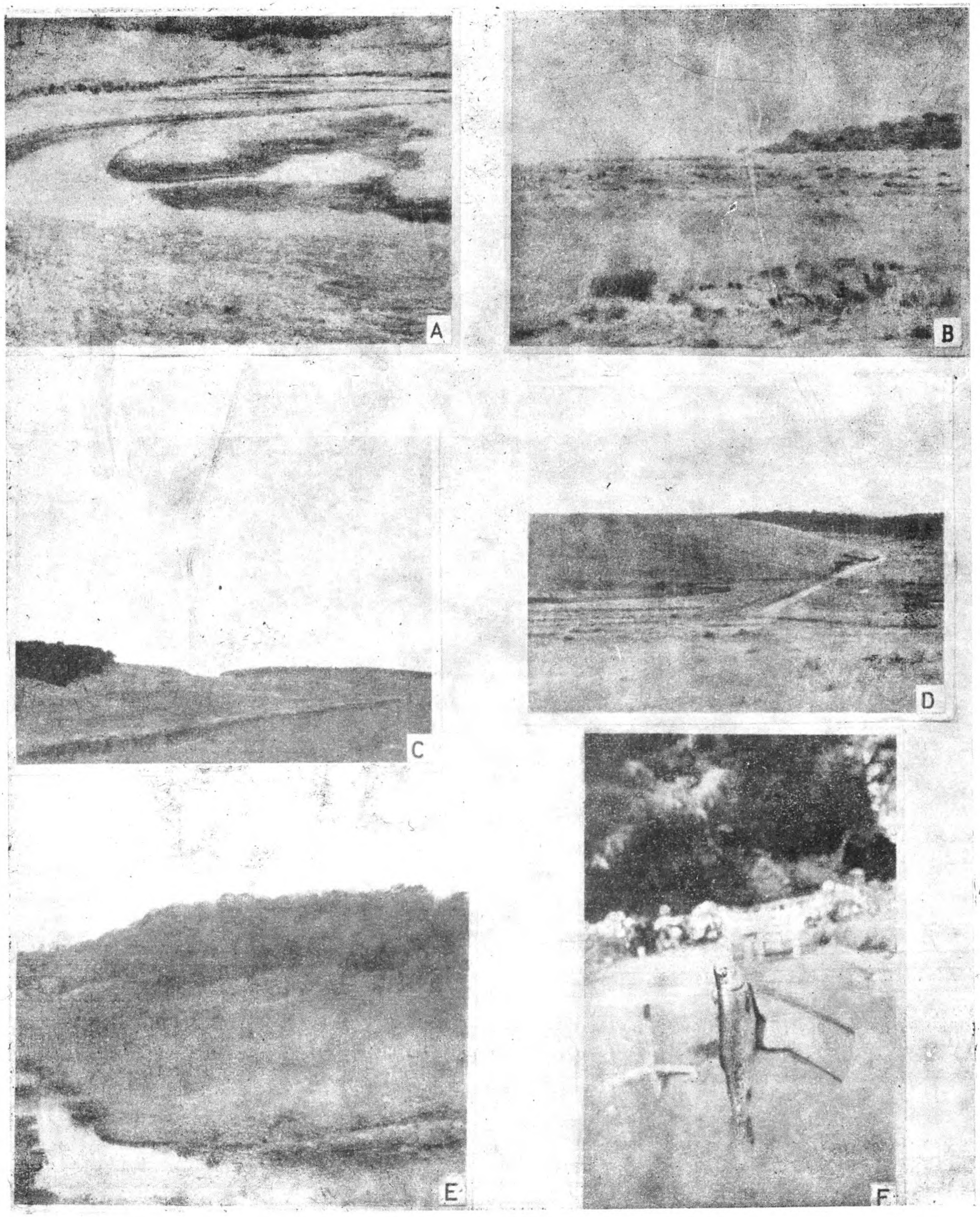
PLATE I

COSTA—HORTON PLAINS STREAM—pp. 15–26

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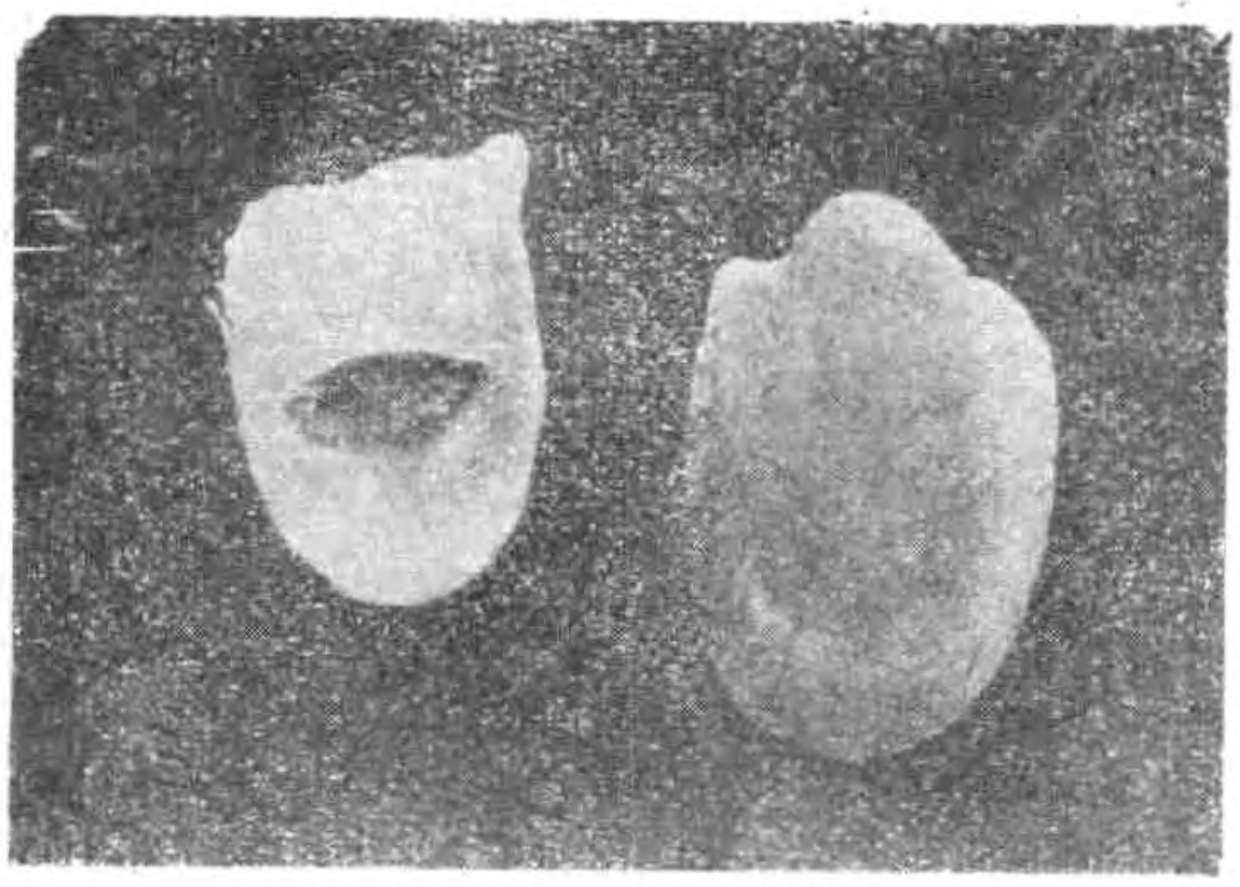

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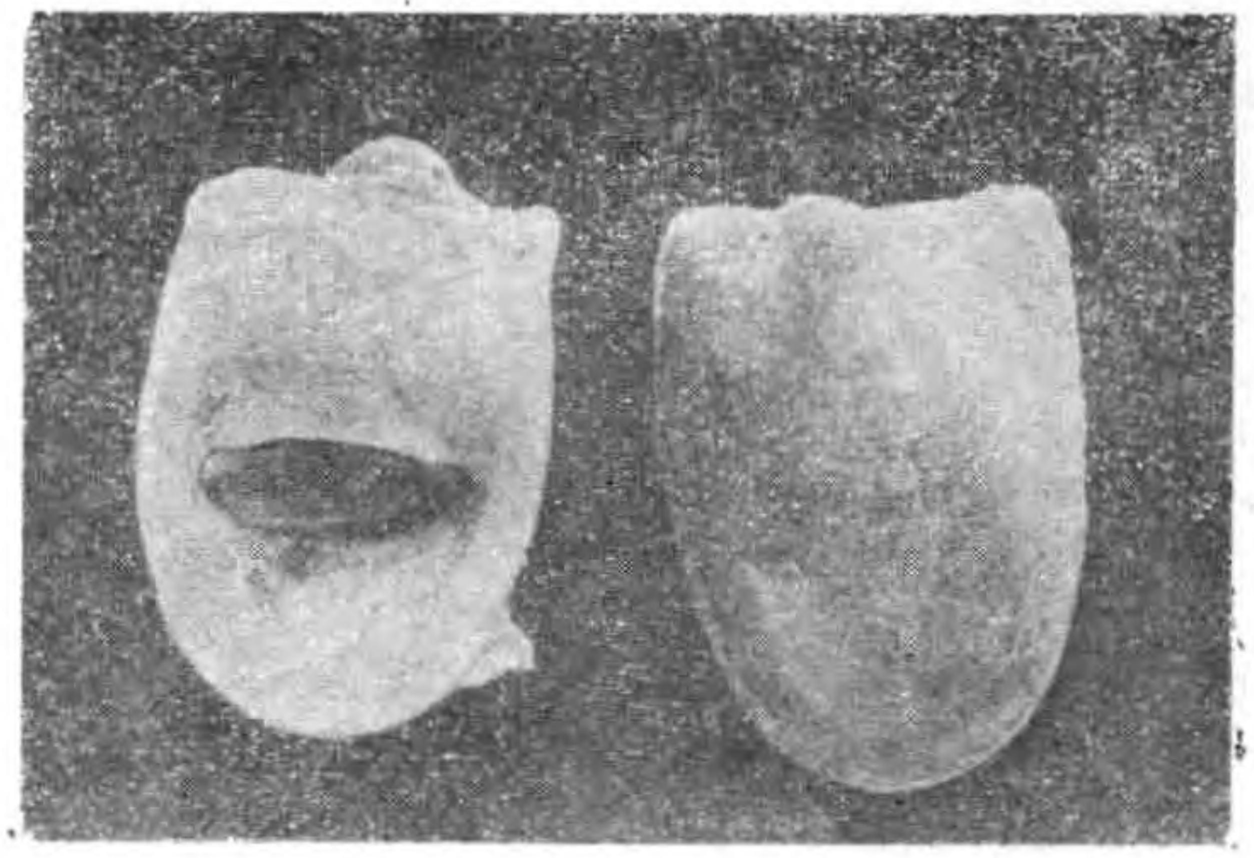

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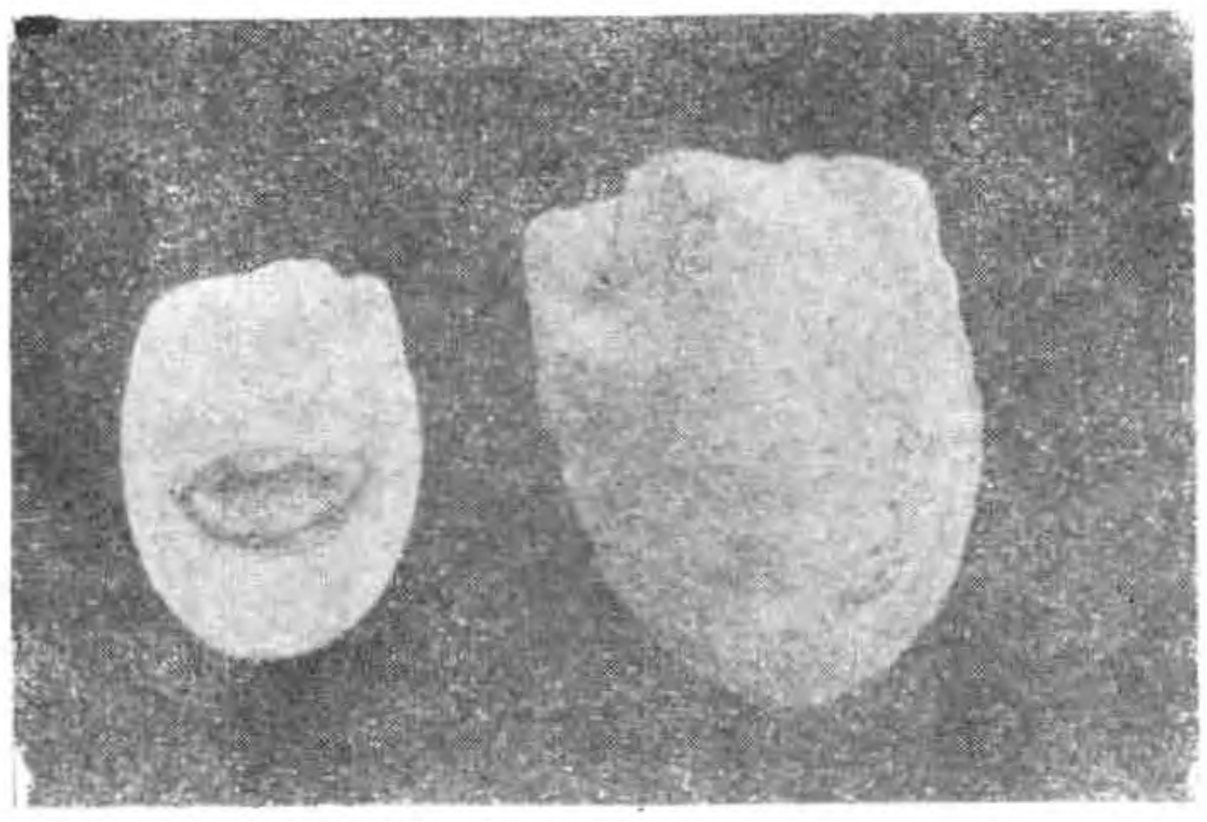

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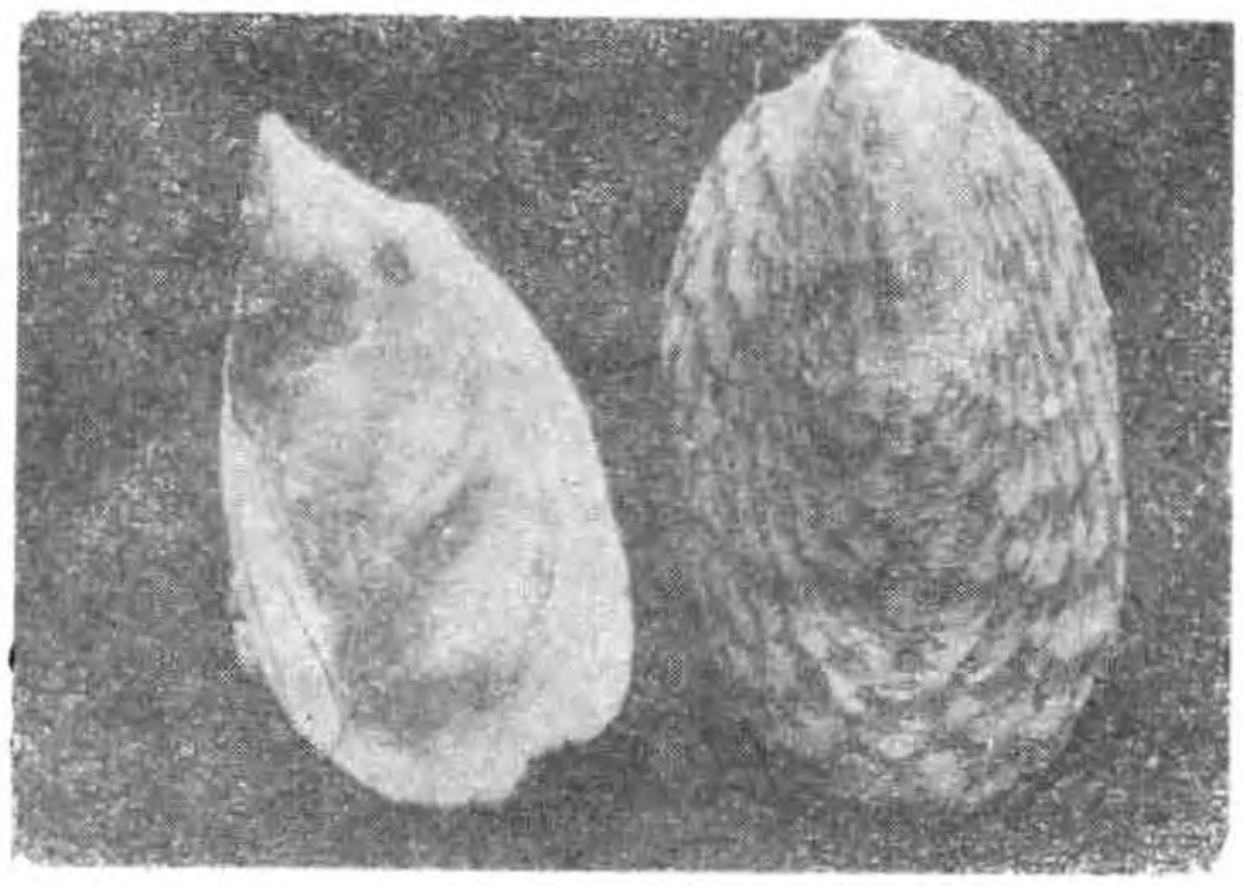

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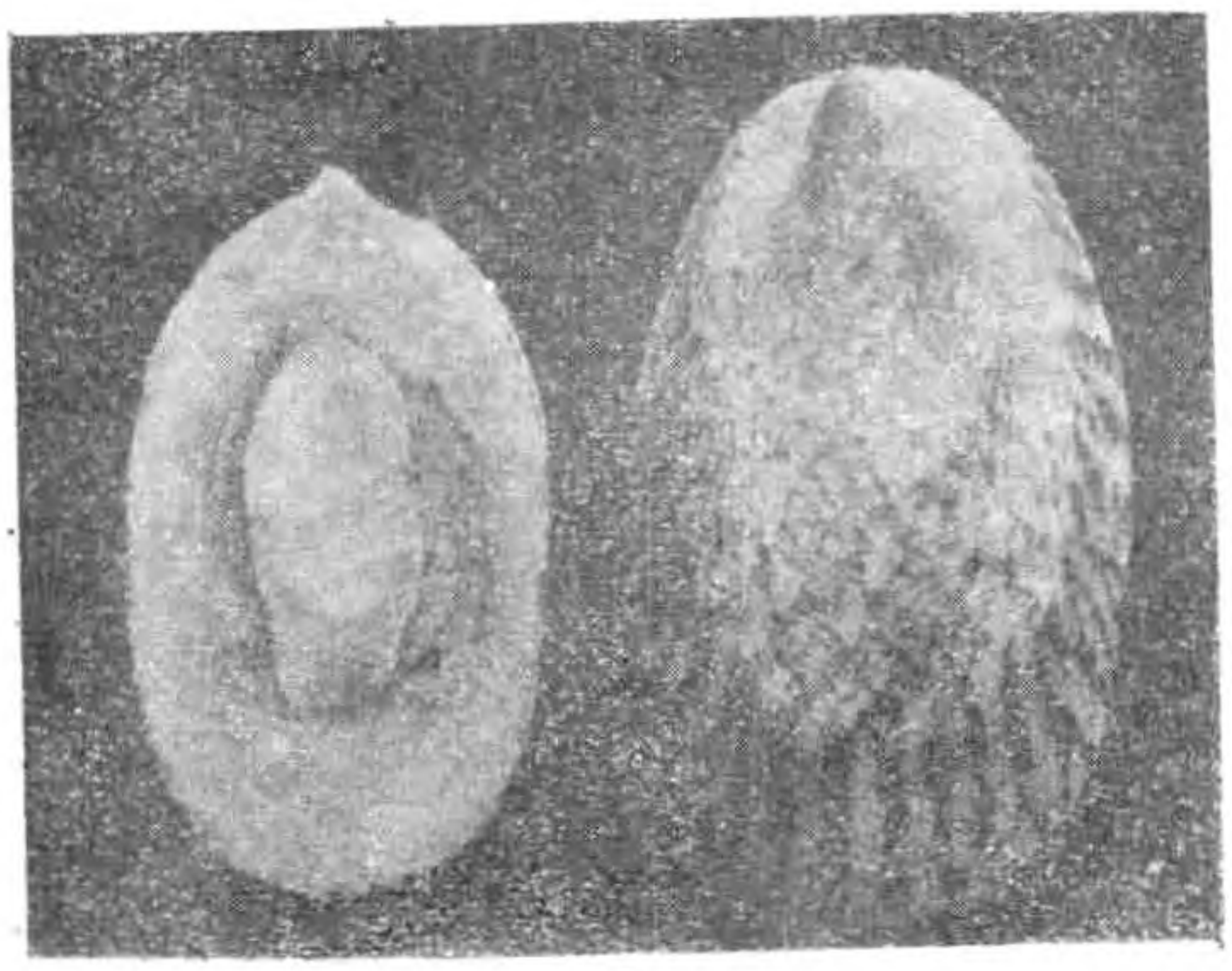

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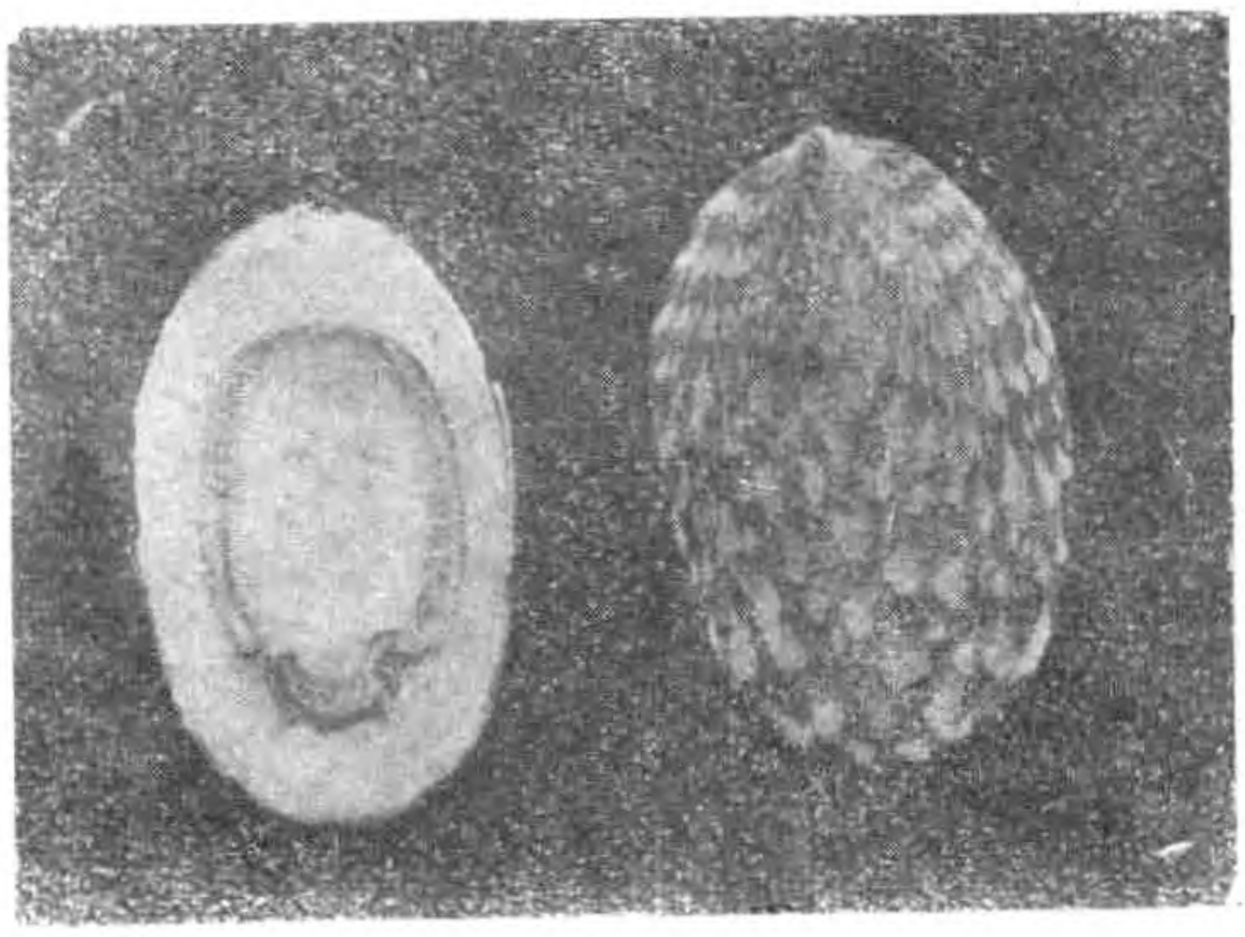

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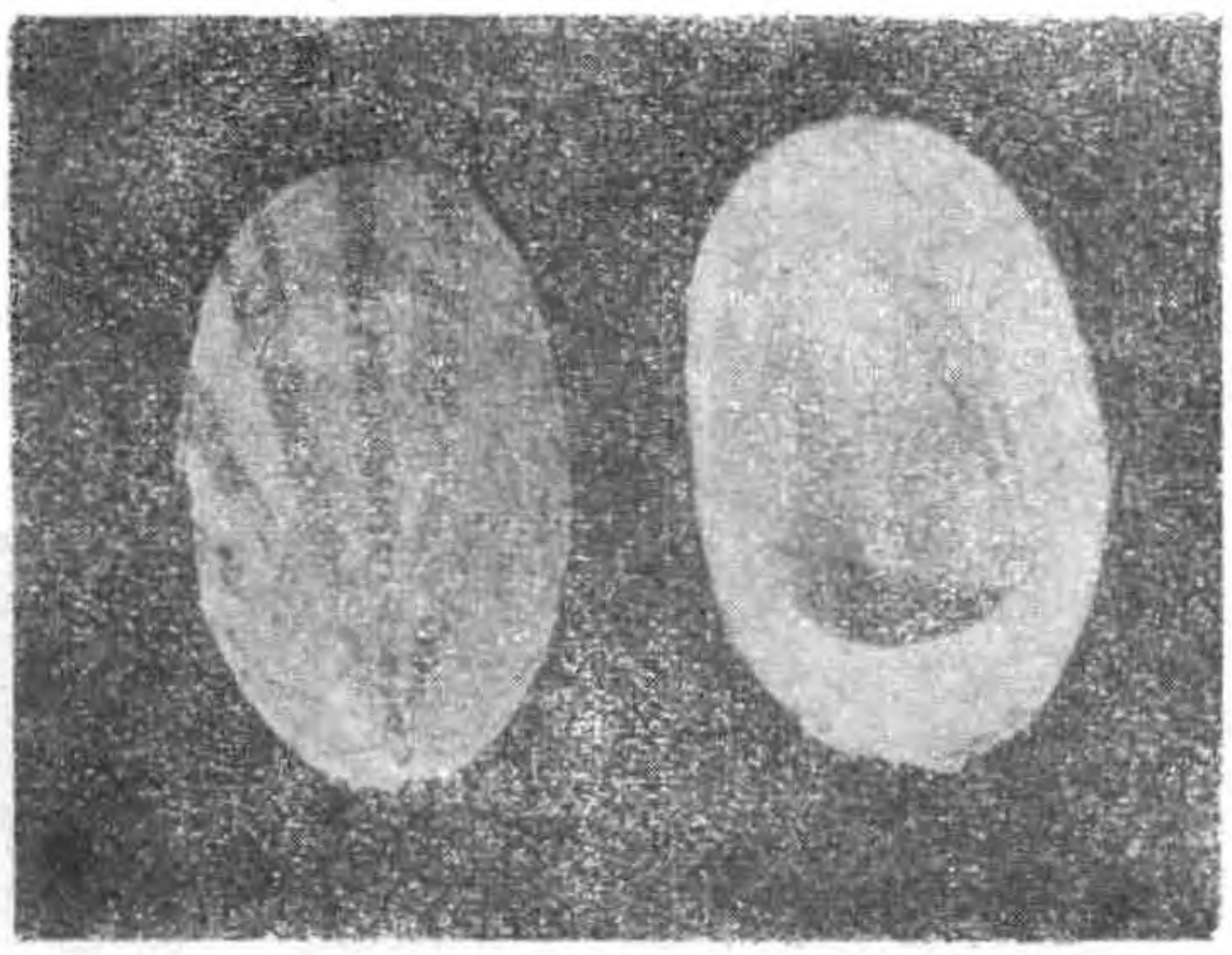

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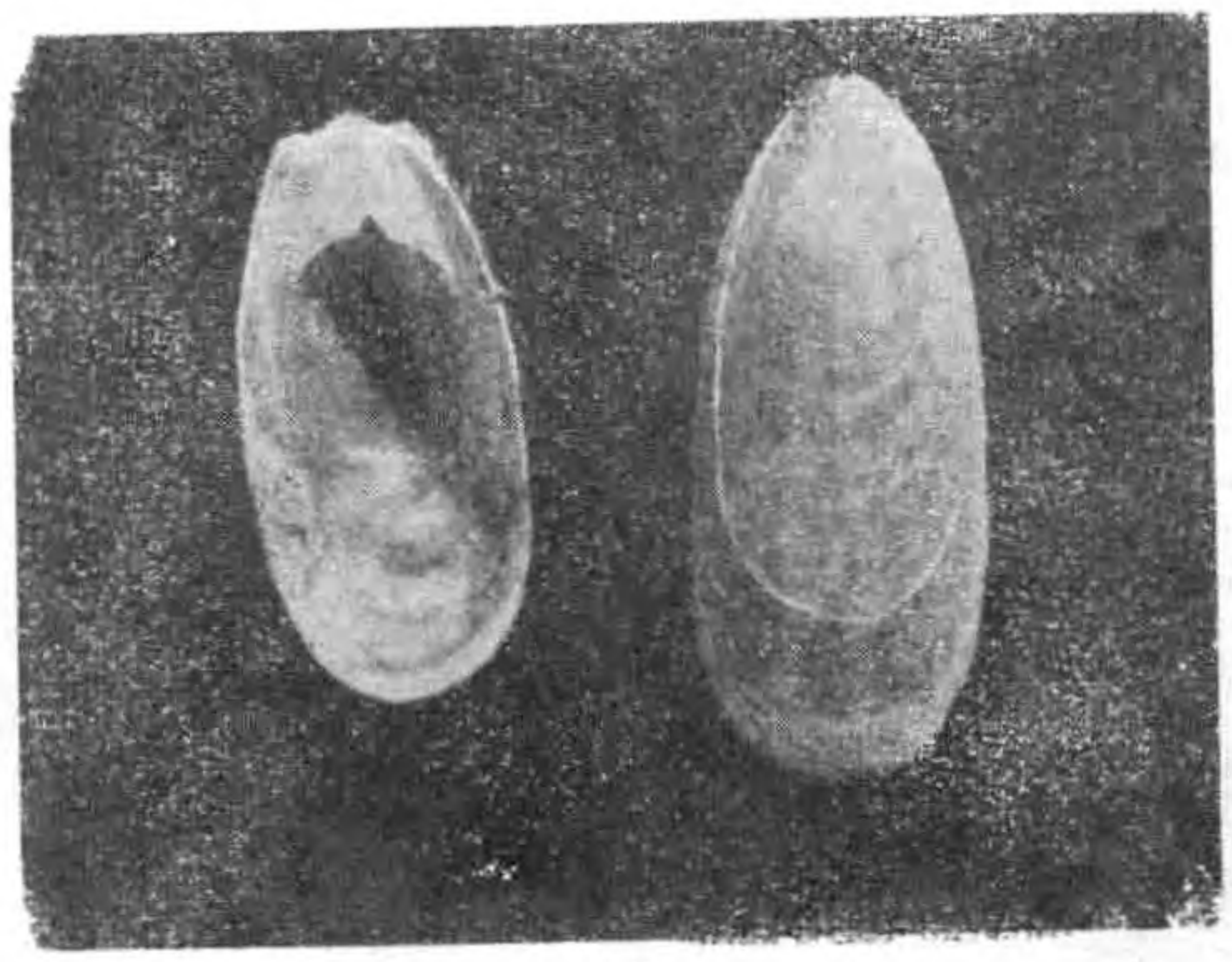

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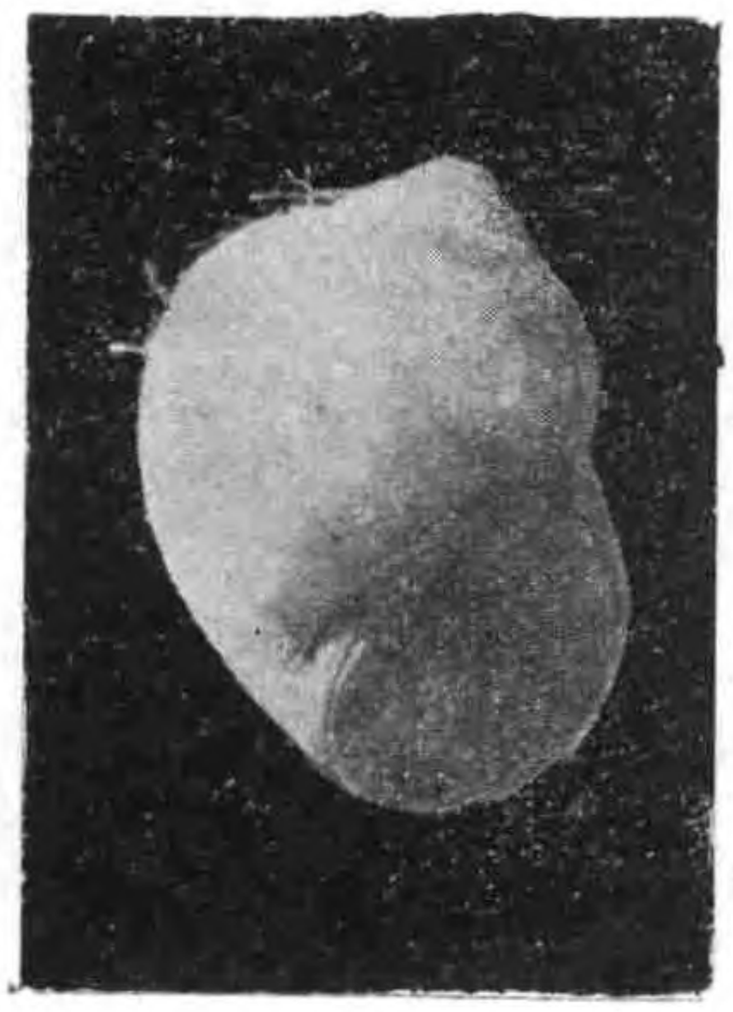

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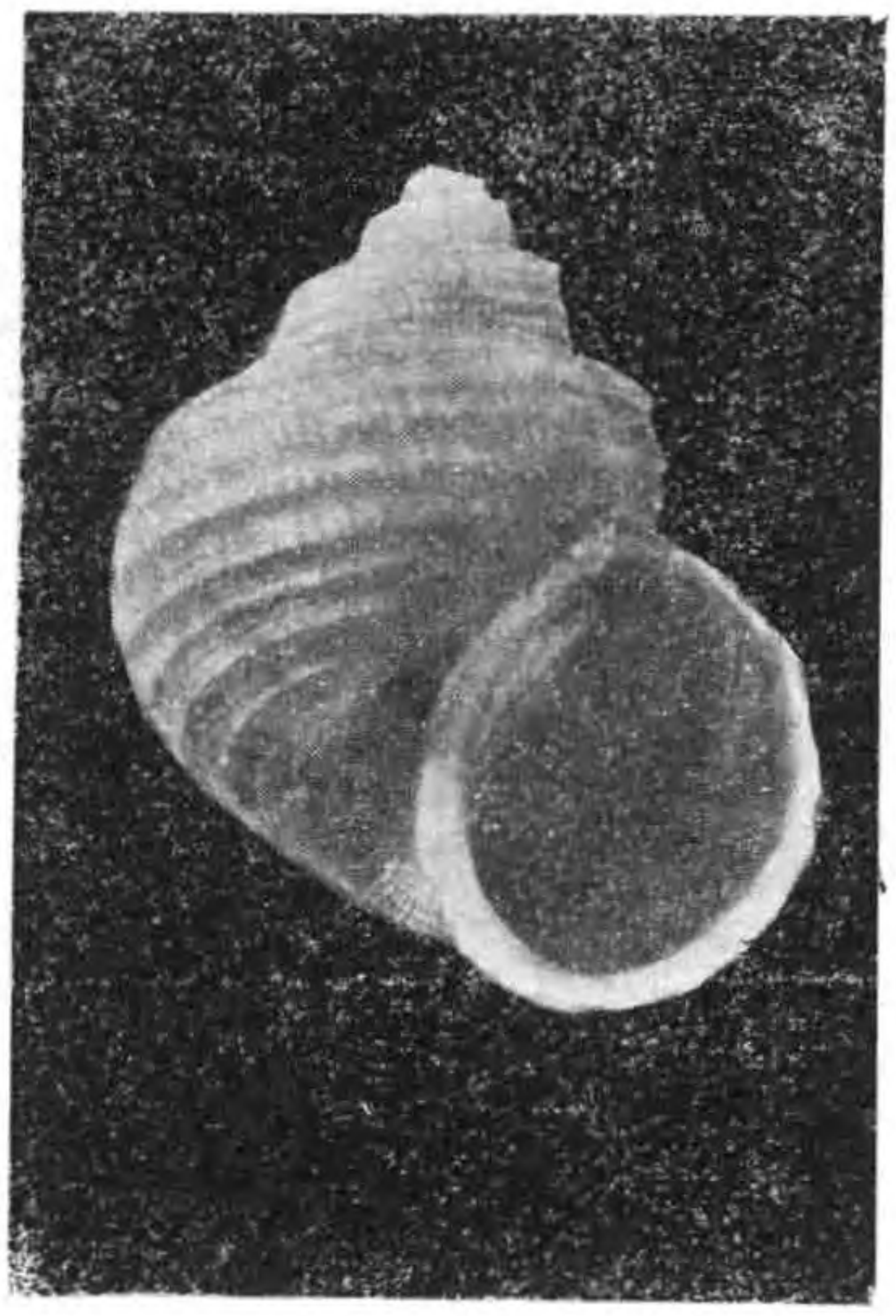

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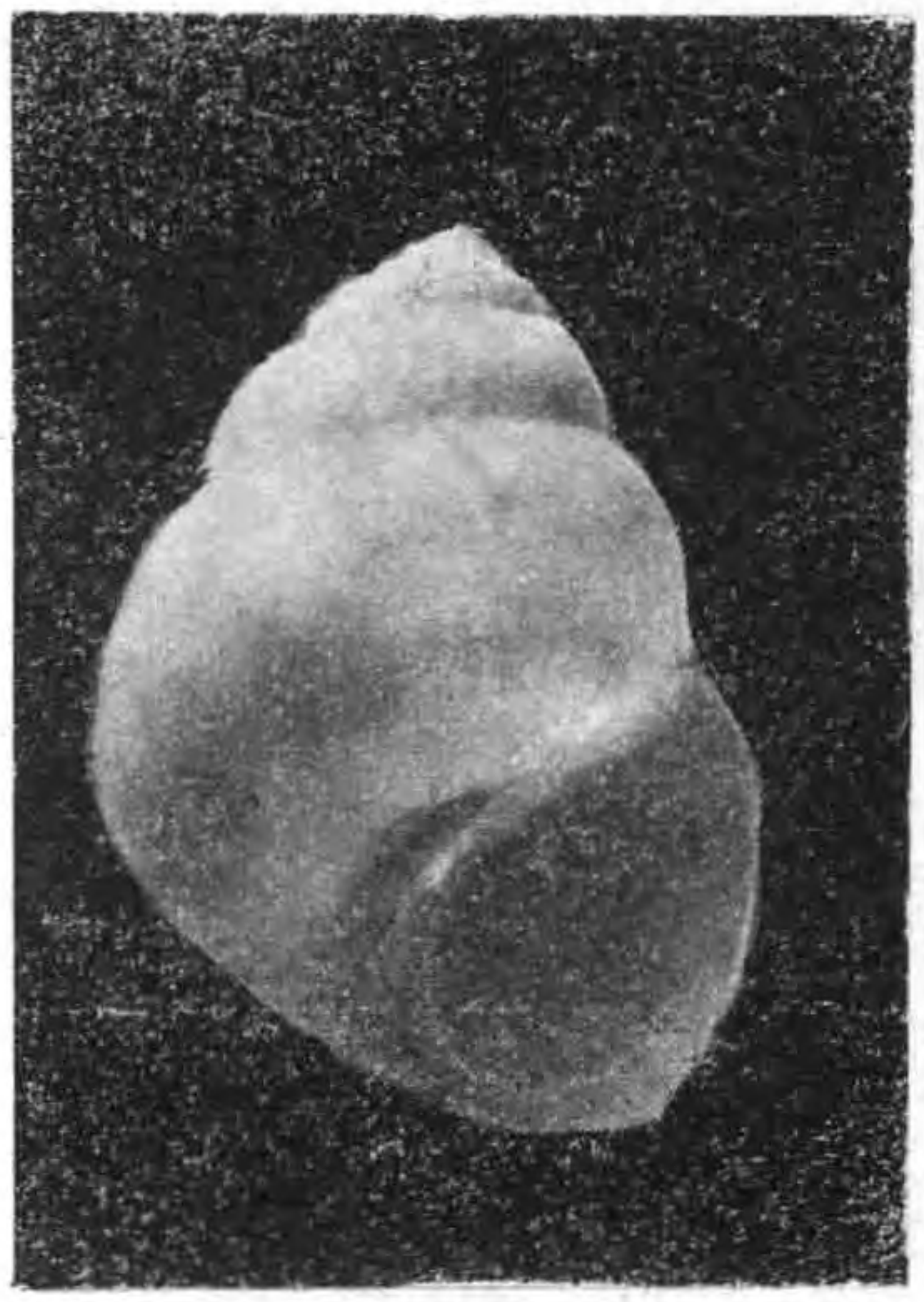

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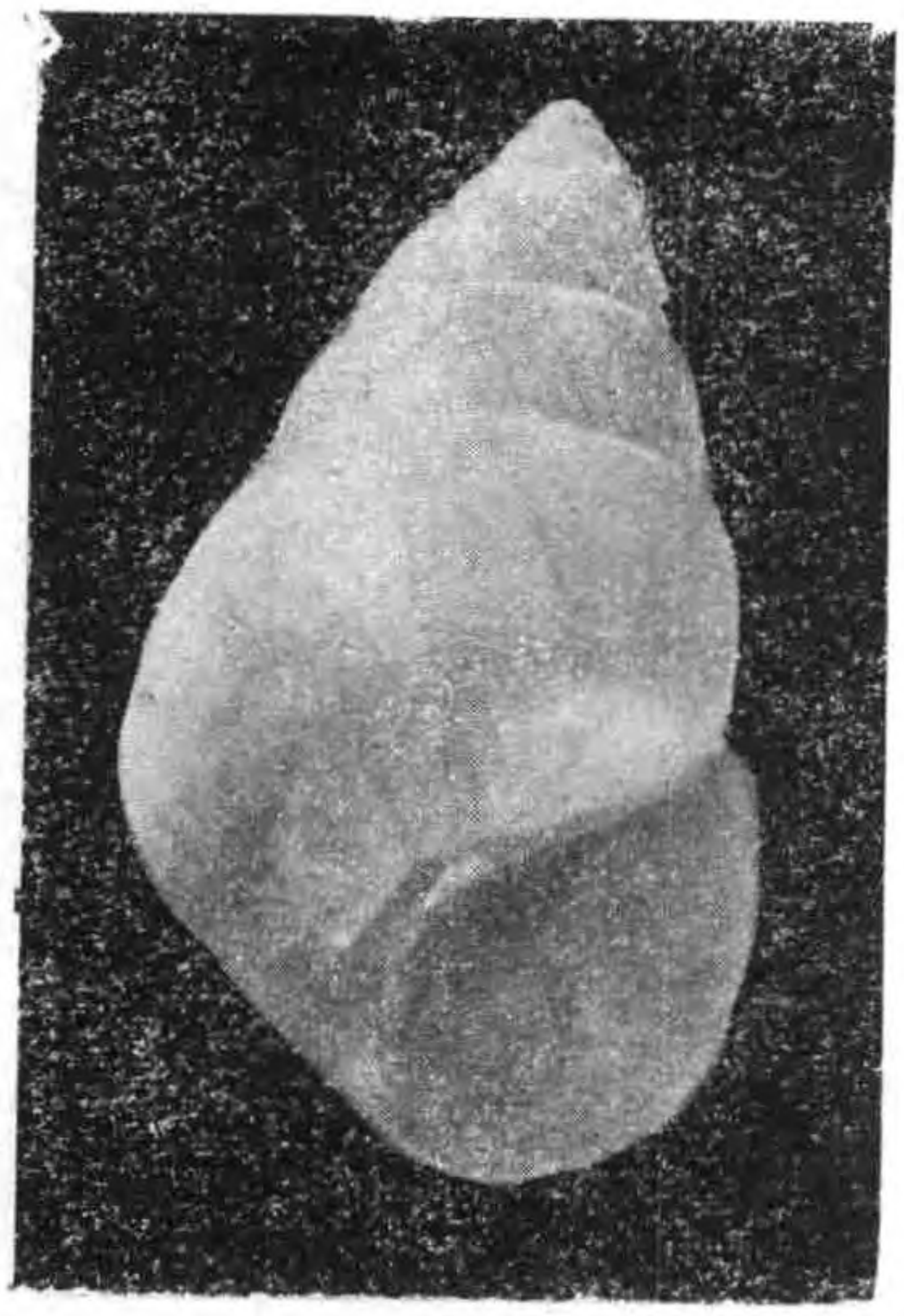

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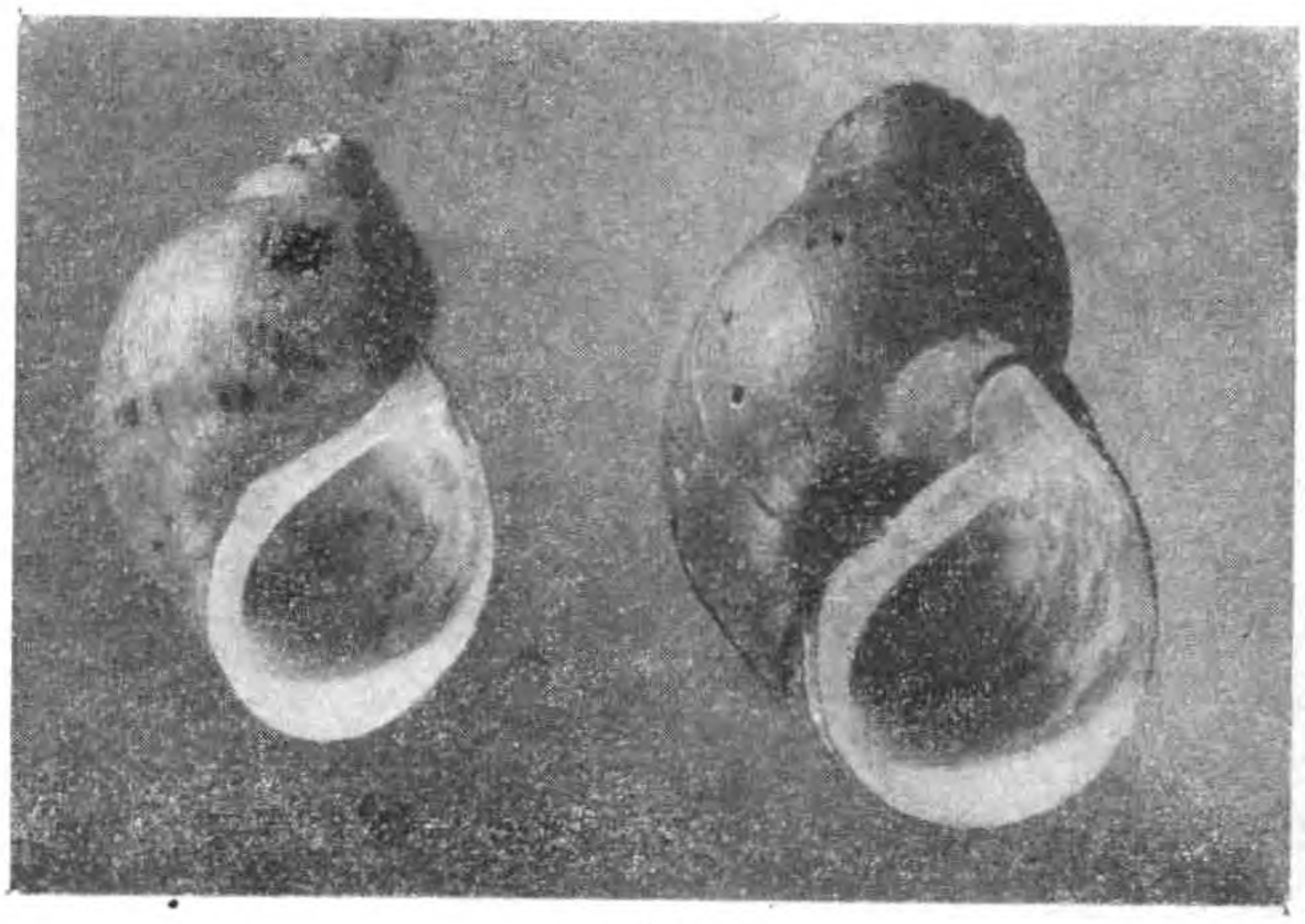

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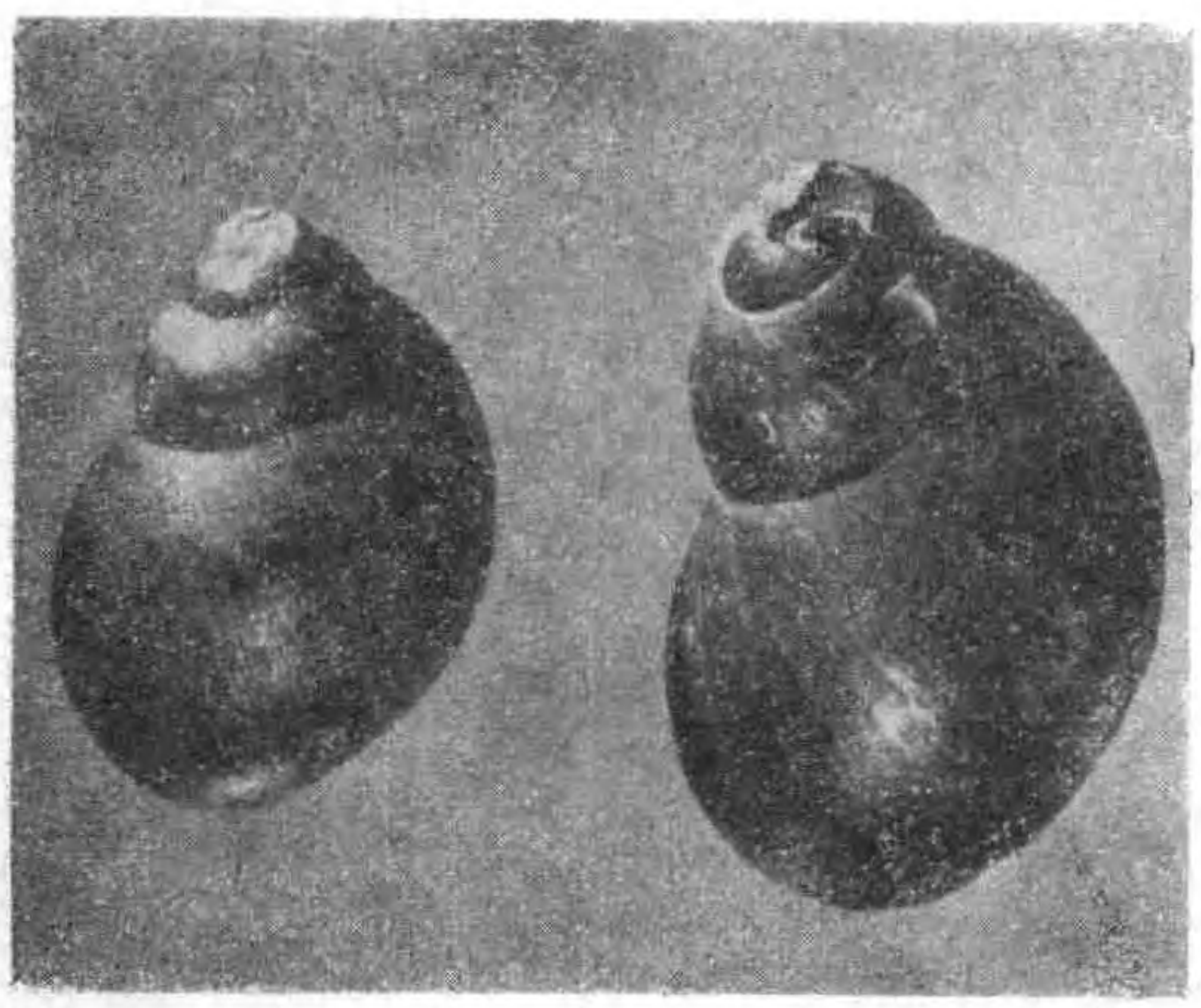

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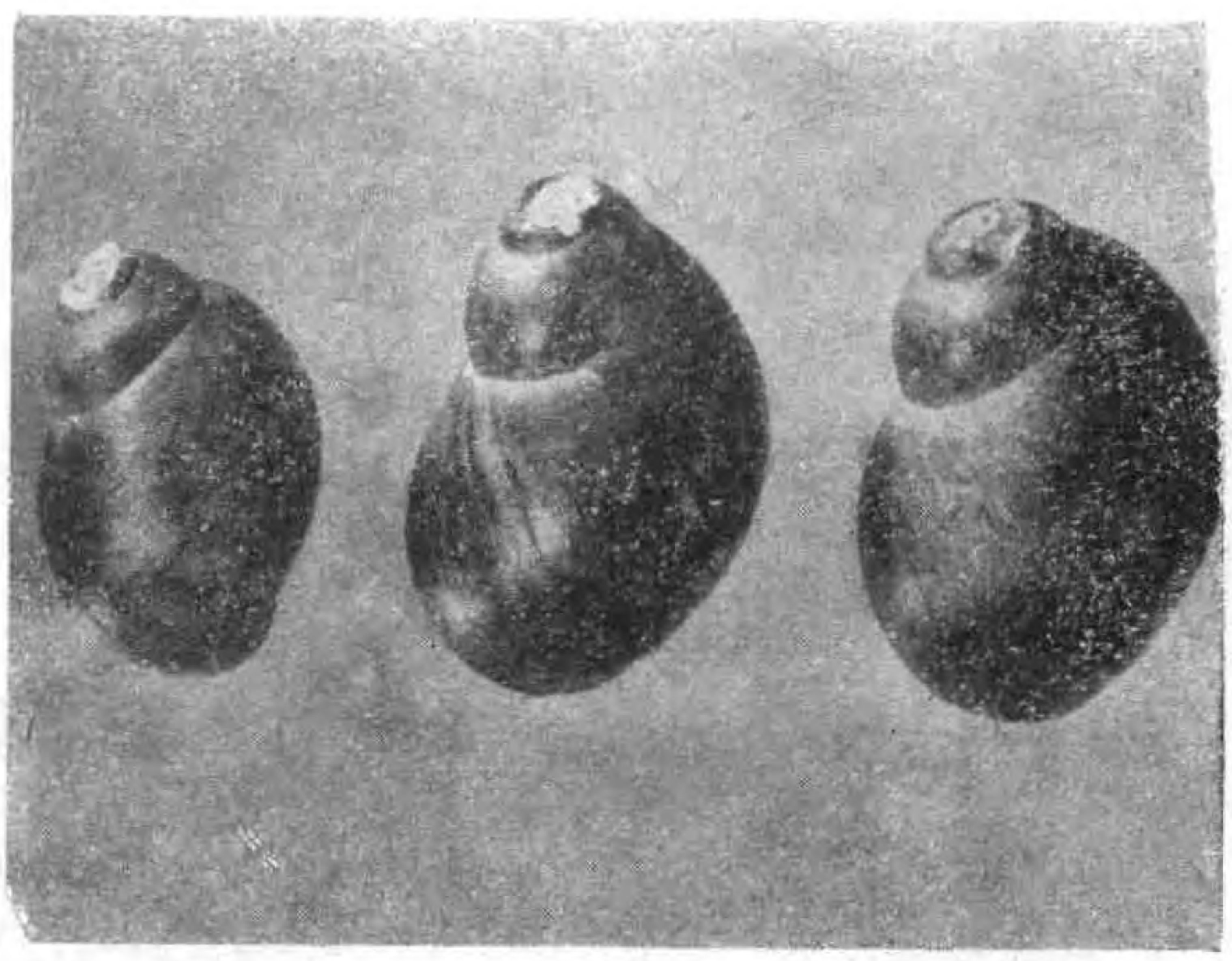

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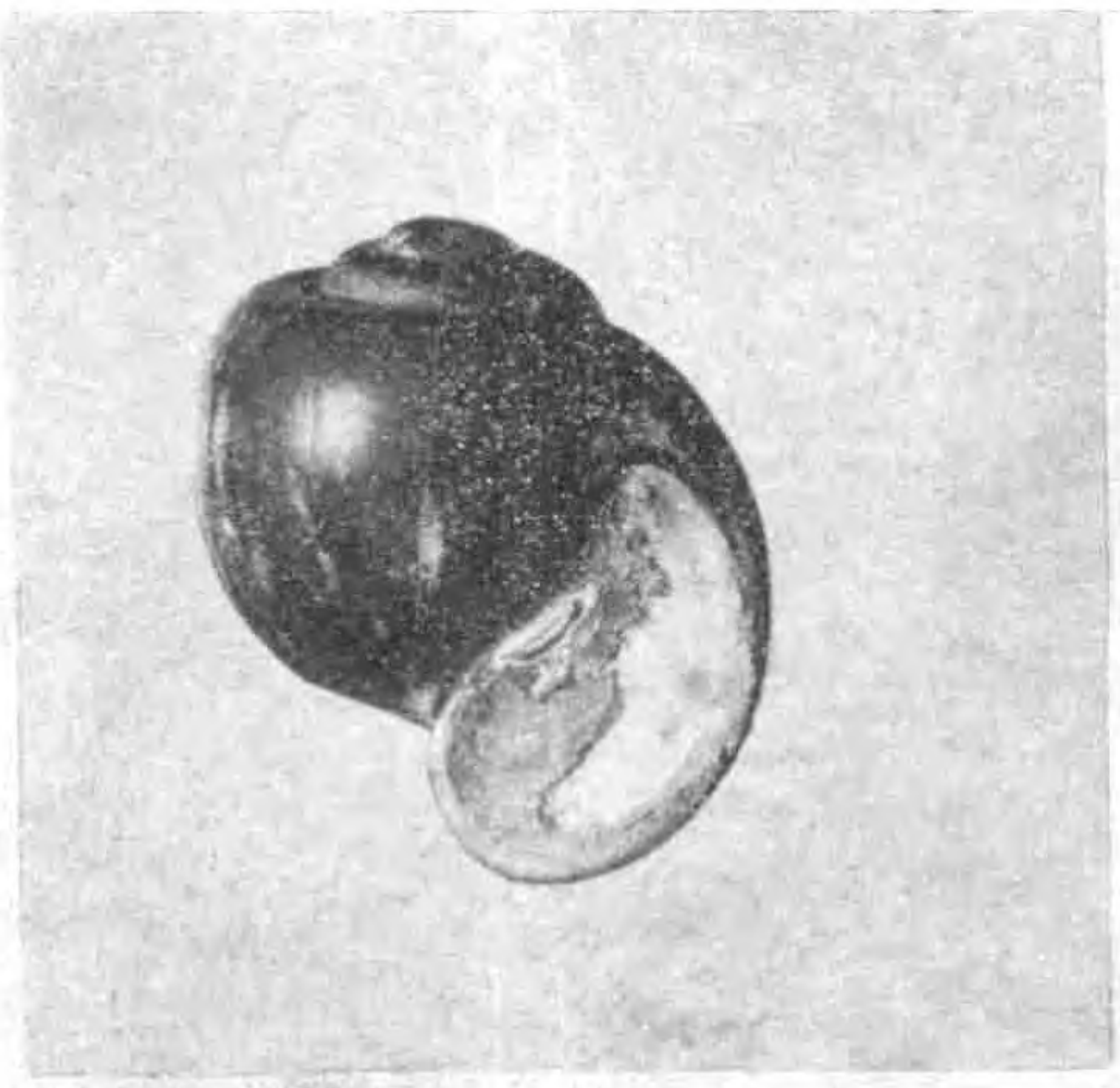

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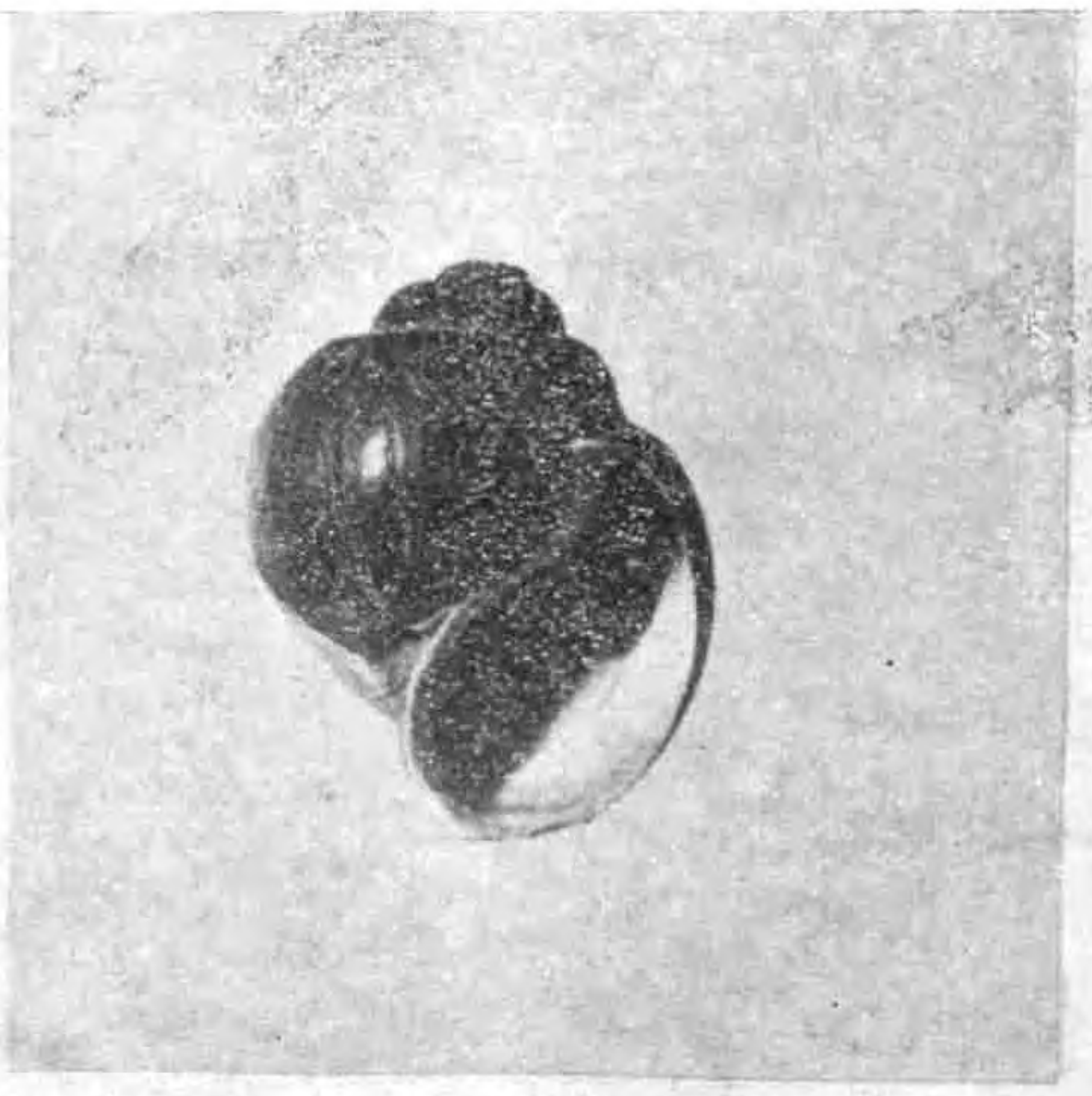

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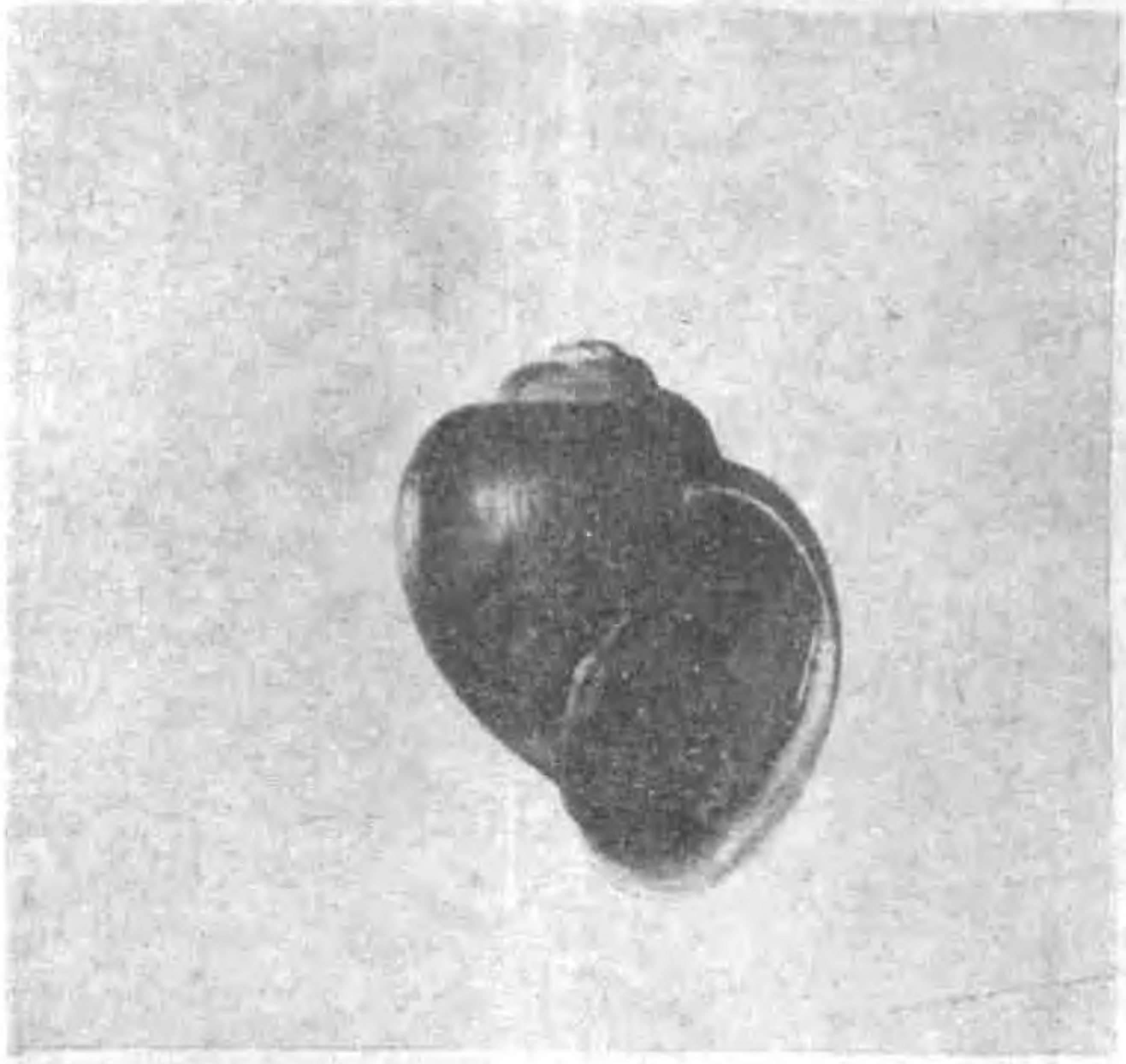

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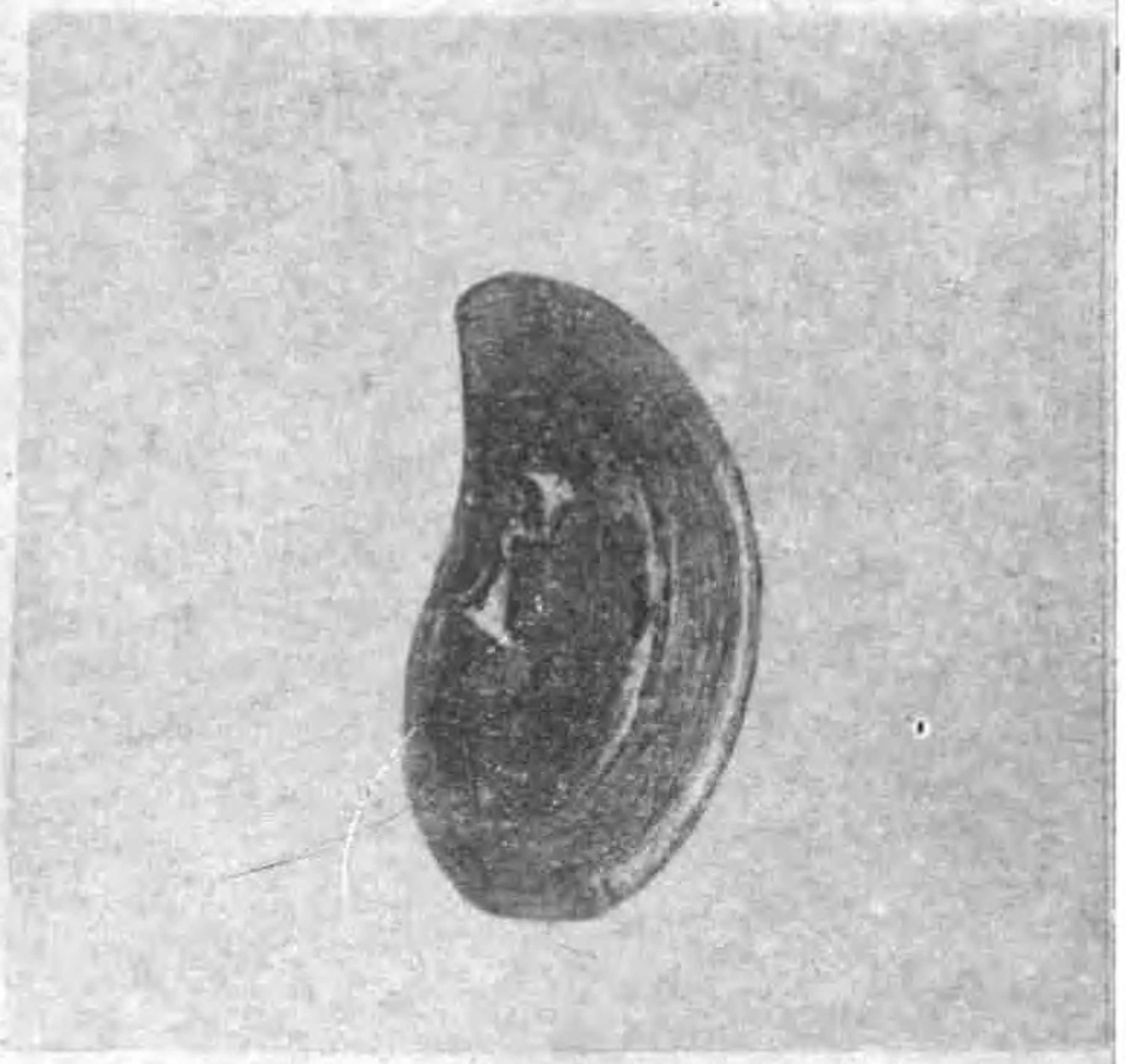

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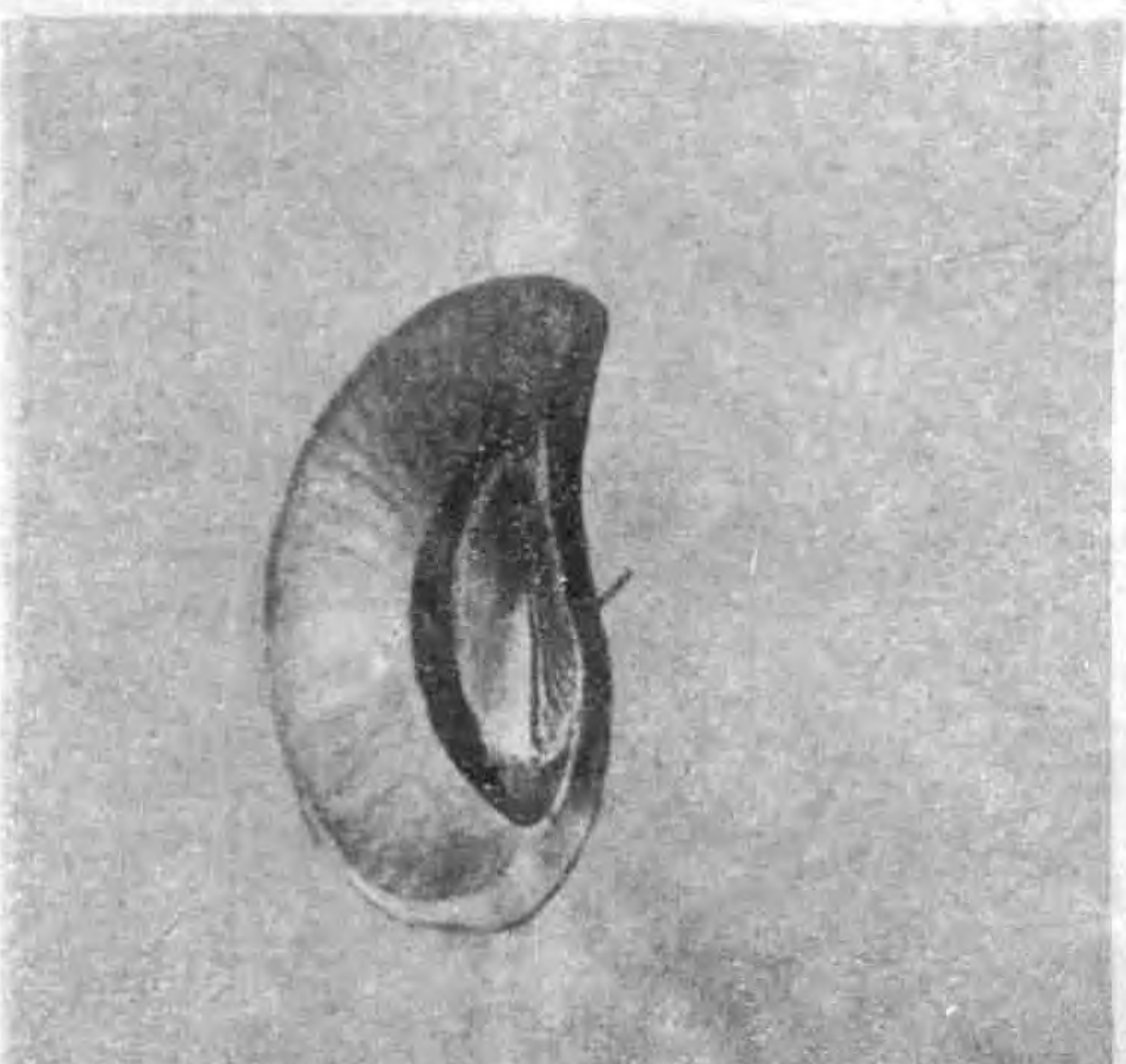

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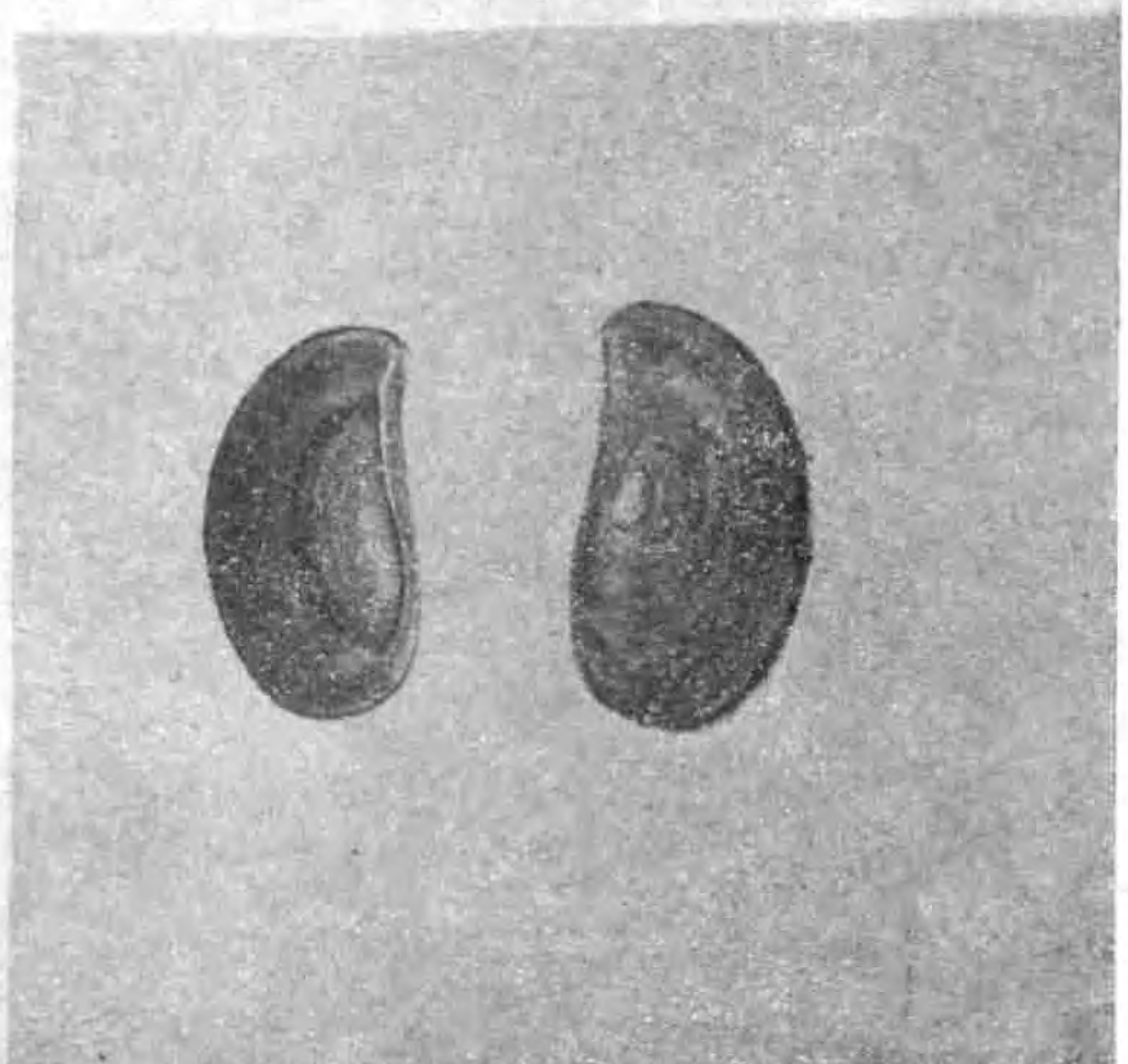

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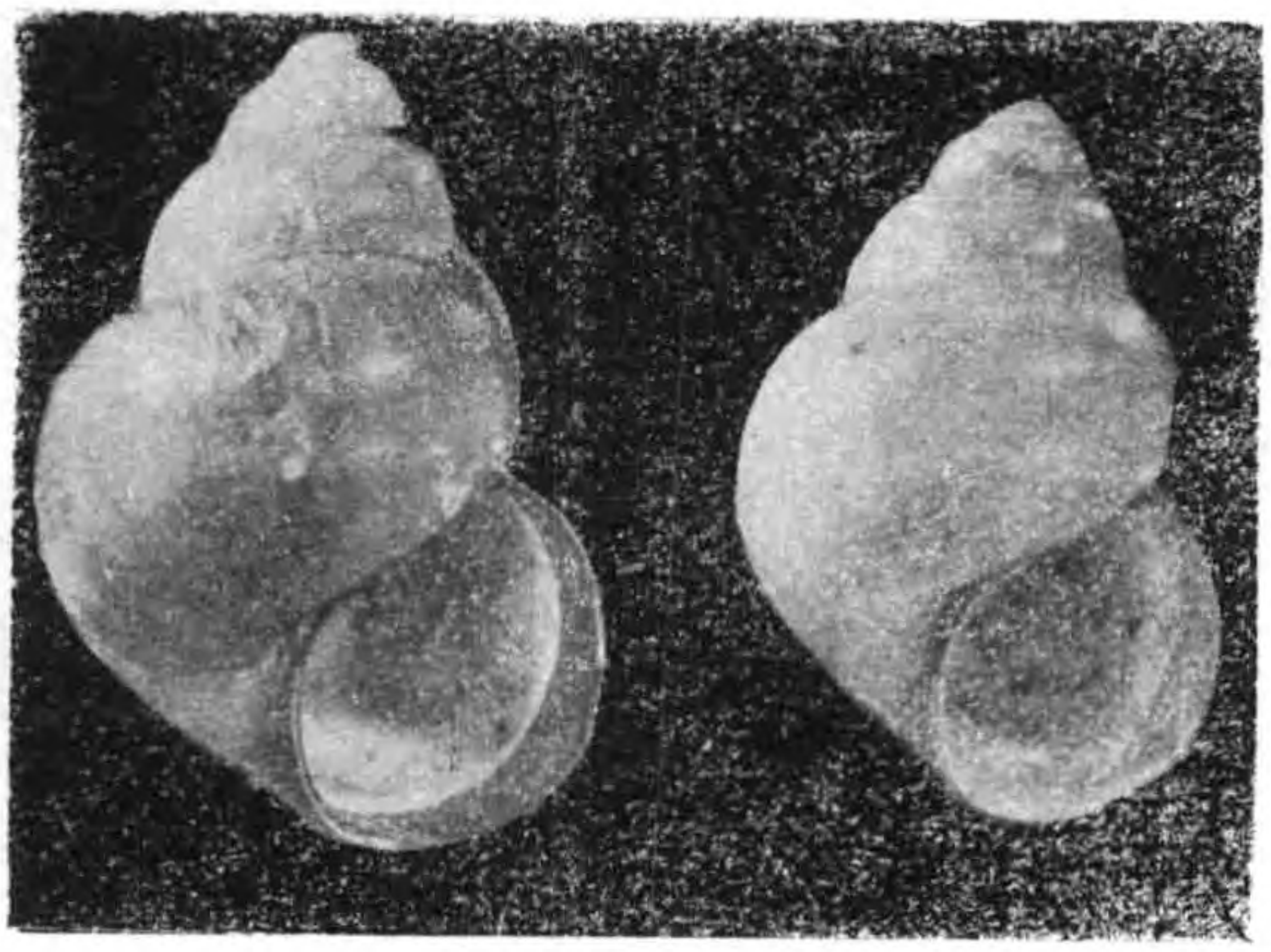

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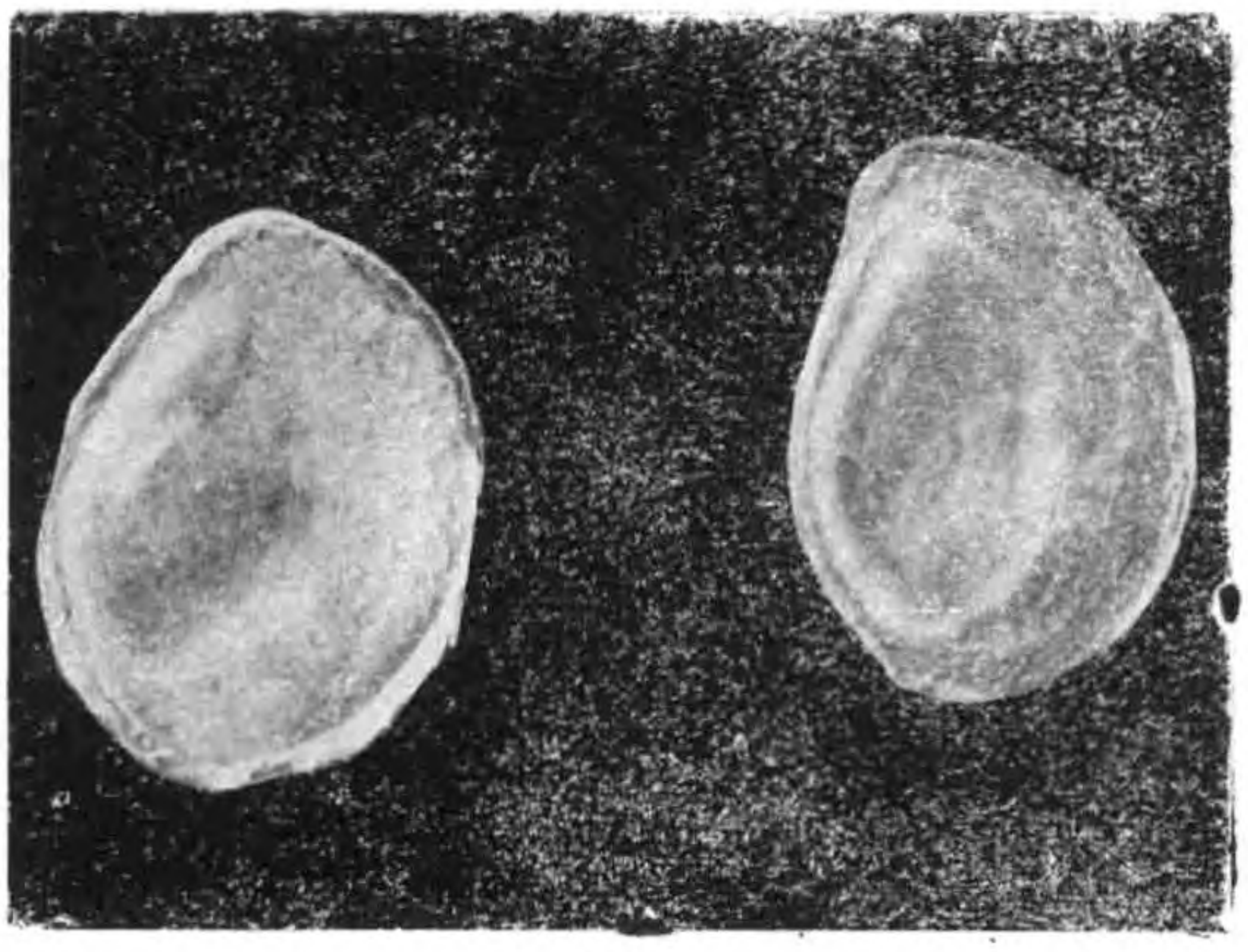

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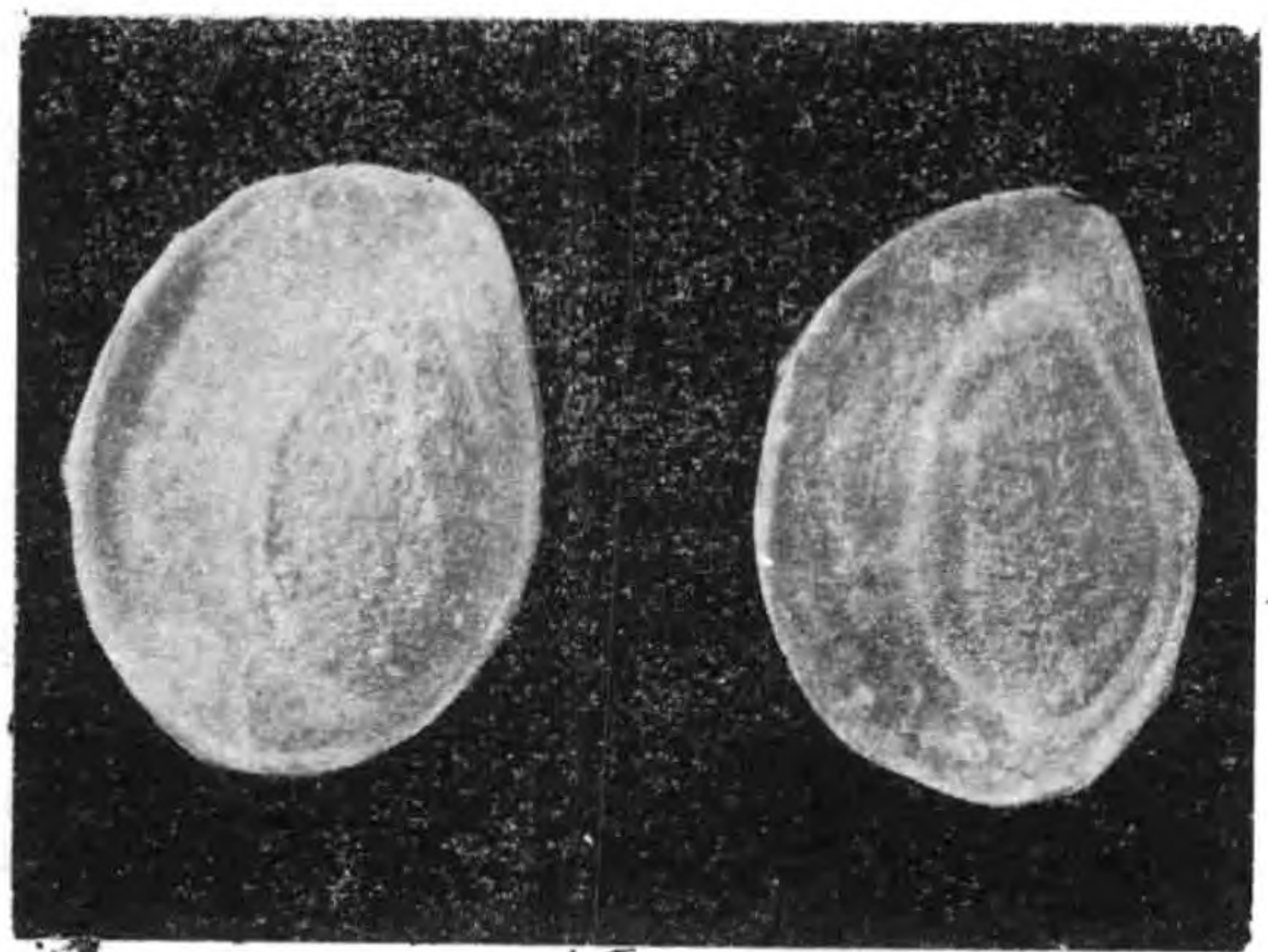

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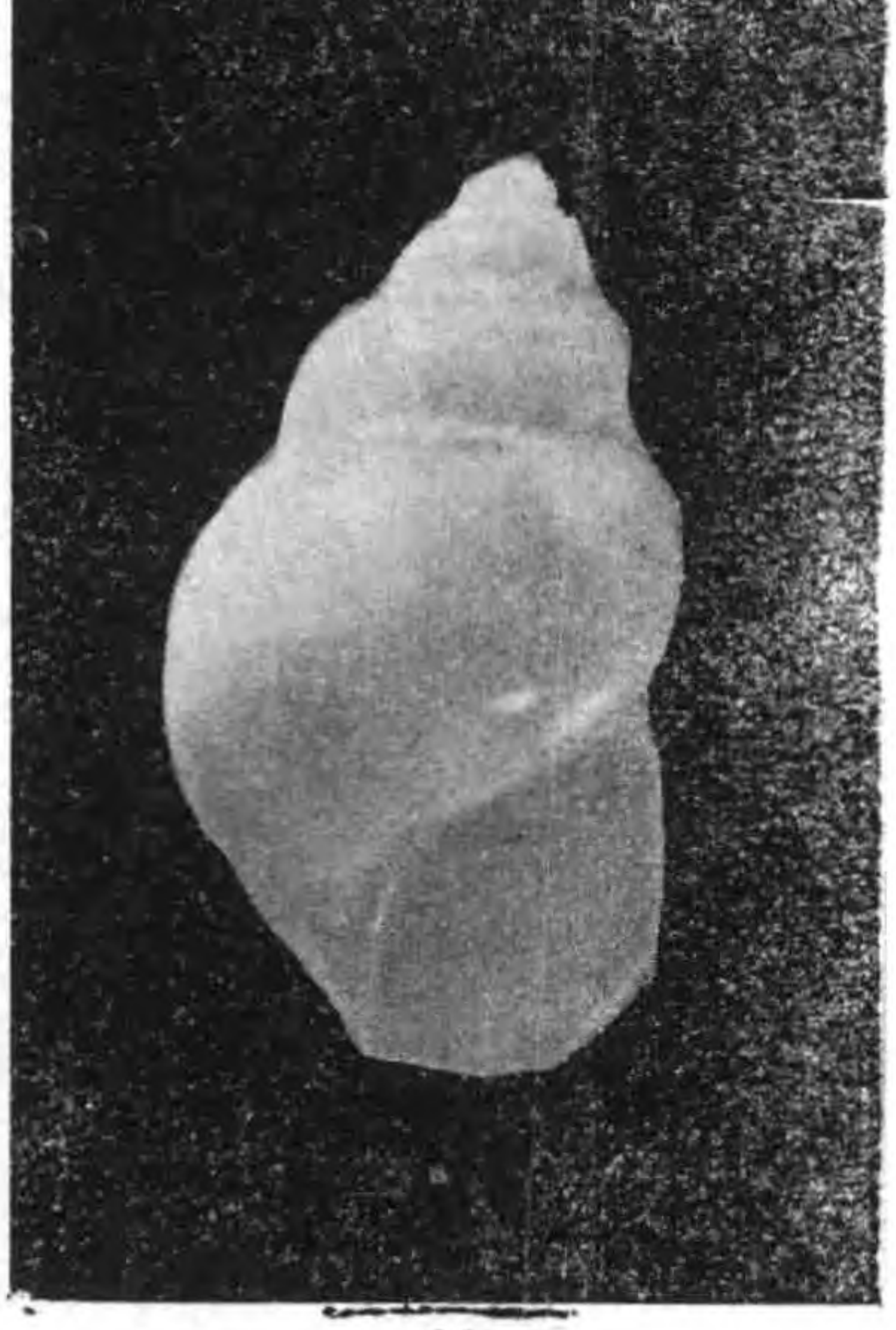

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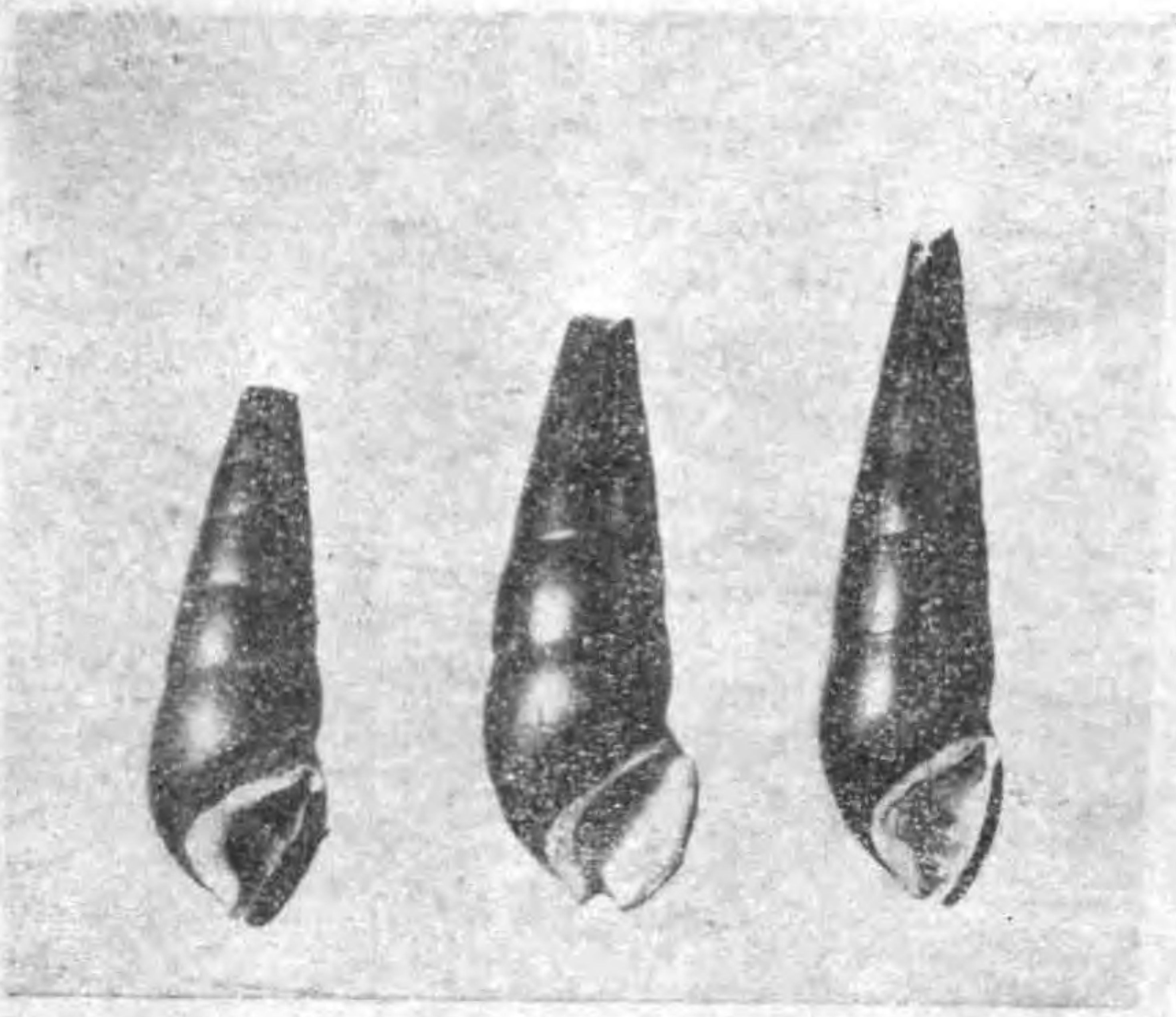

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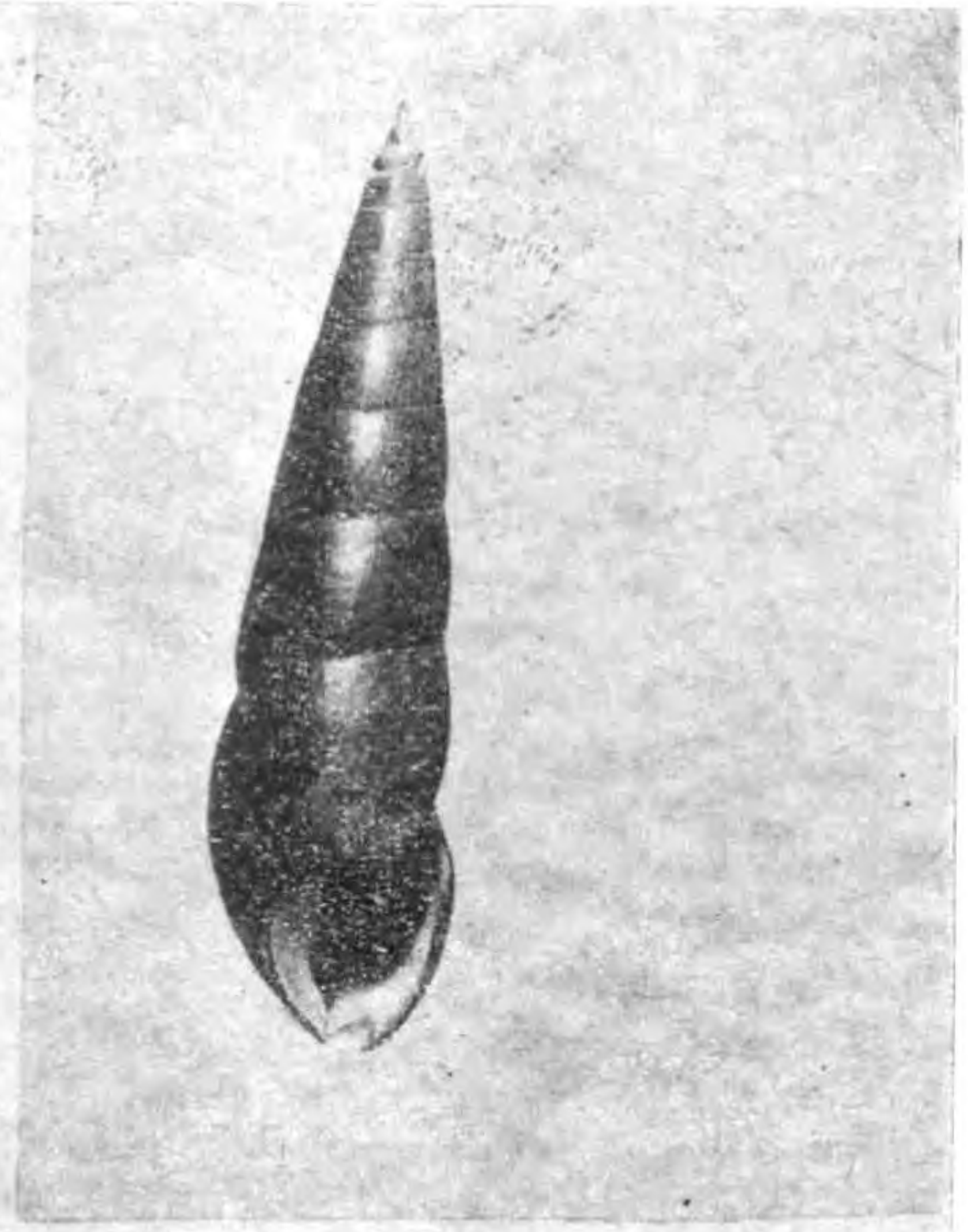

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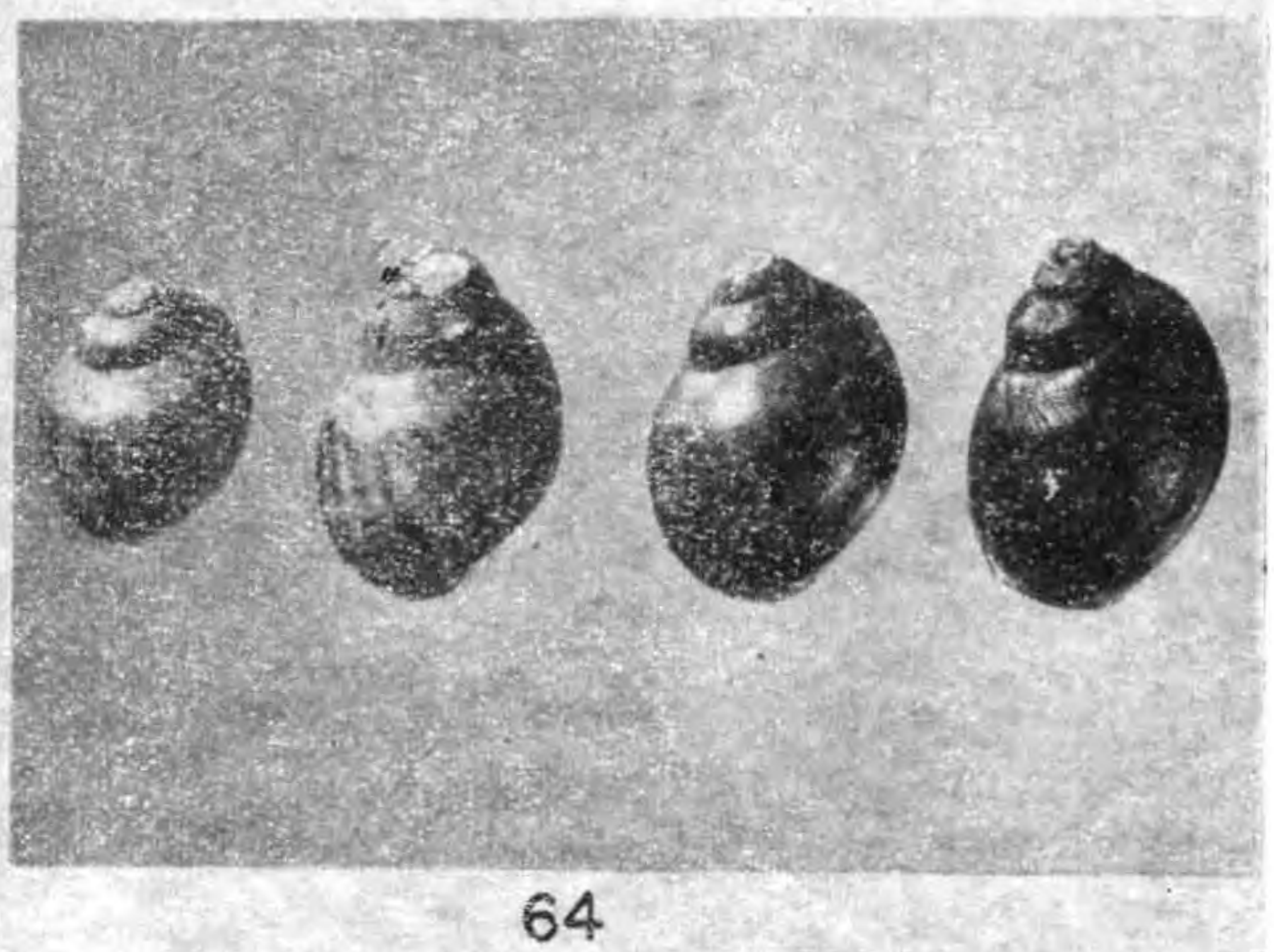

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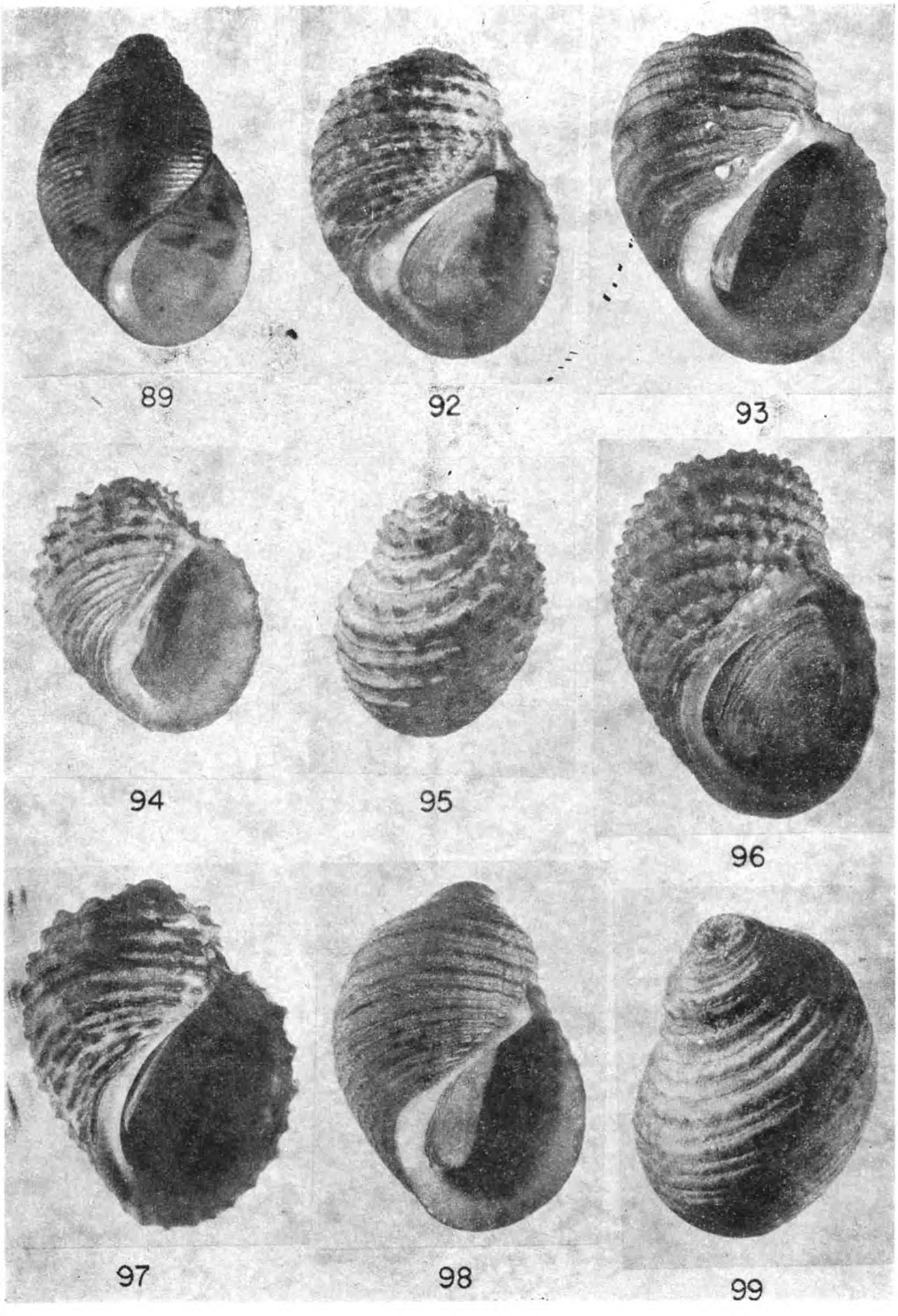

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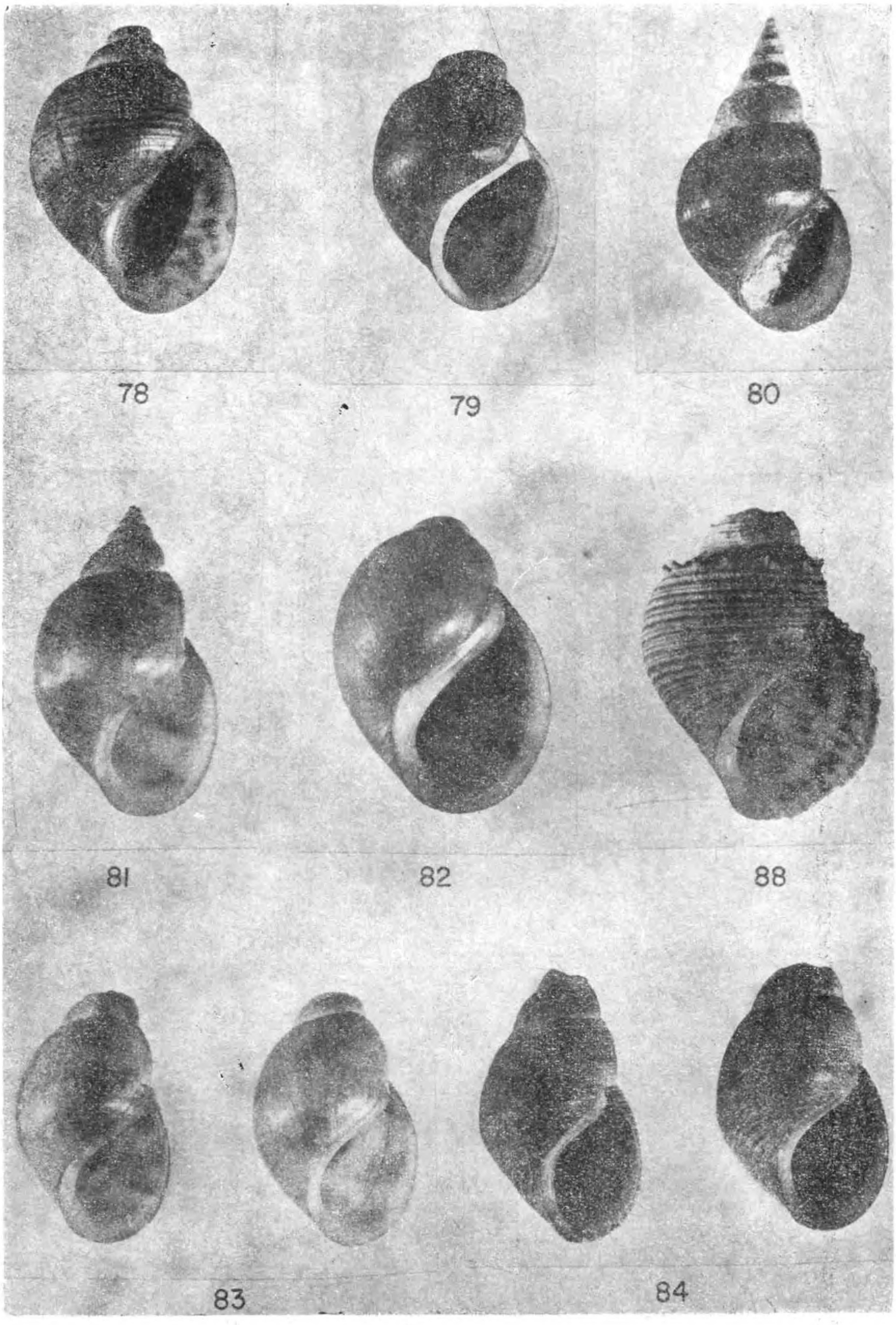
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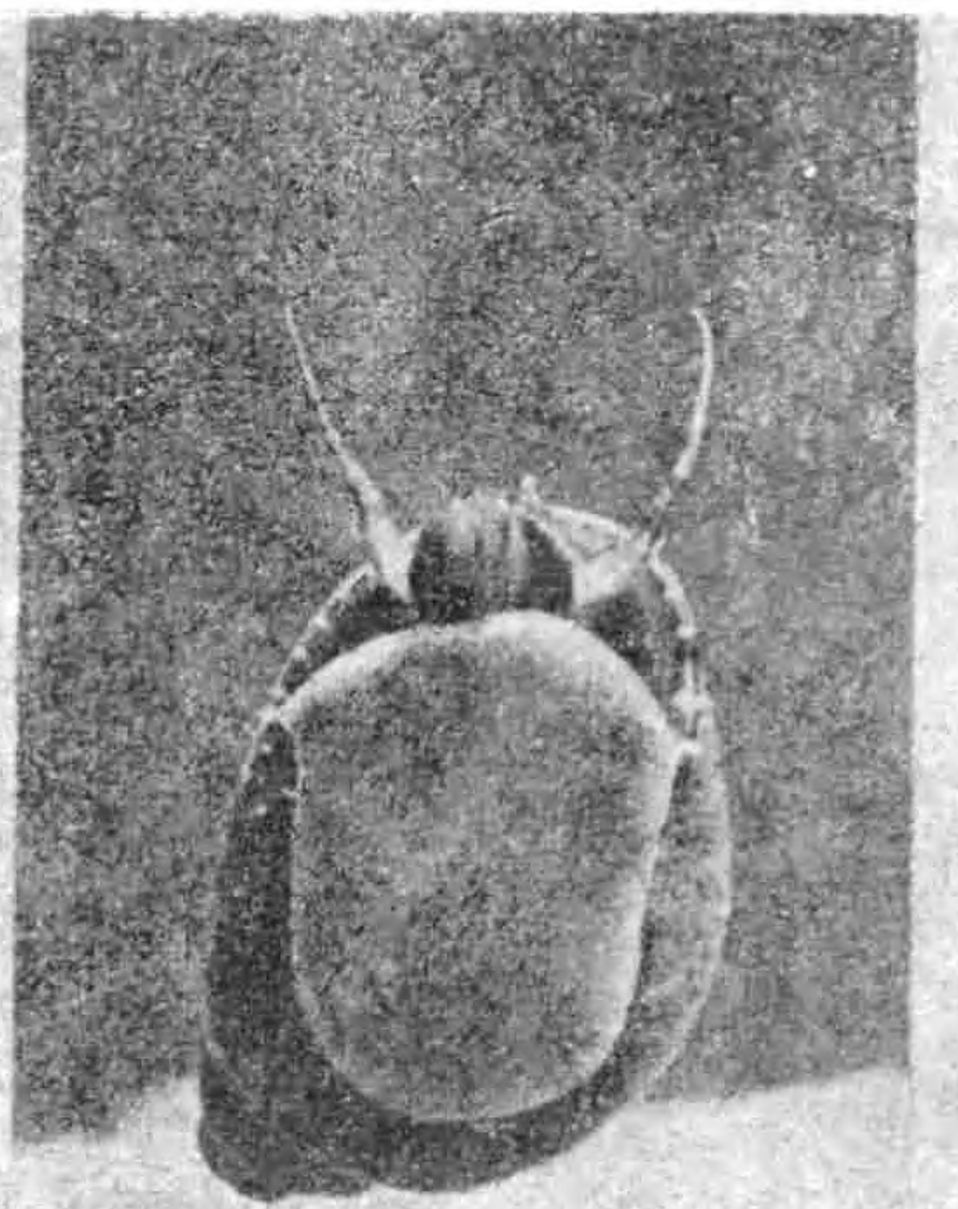

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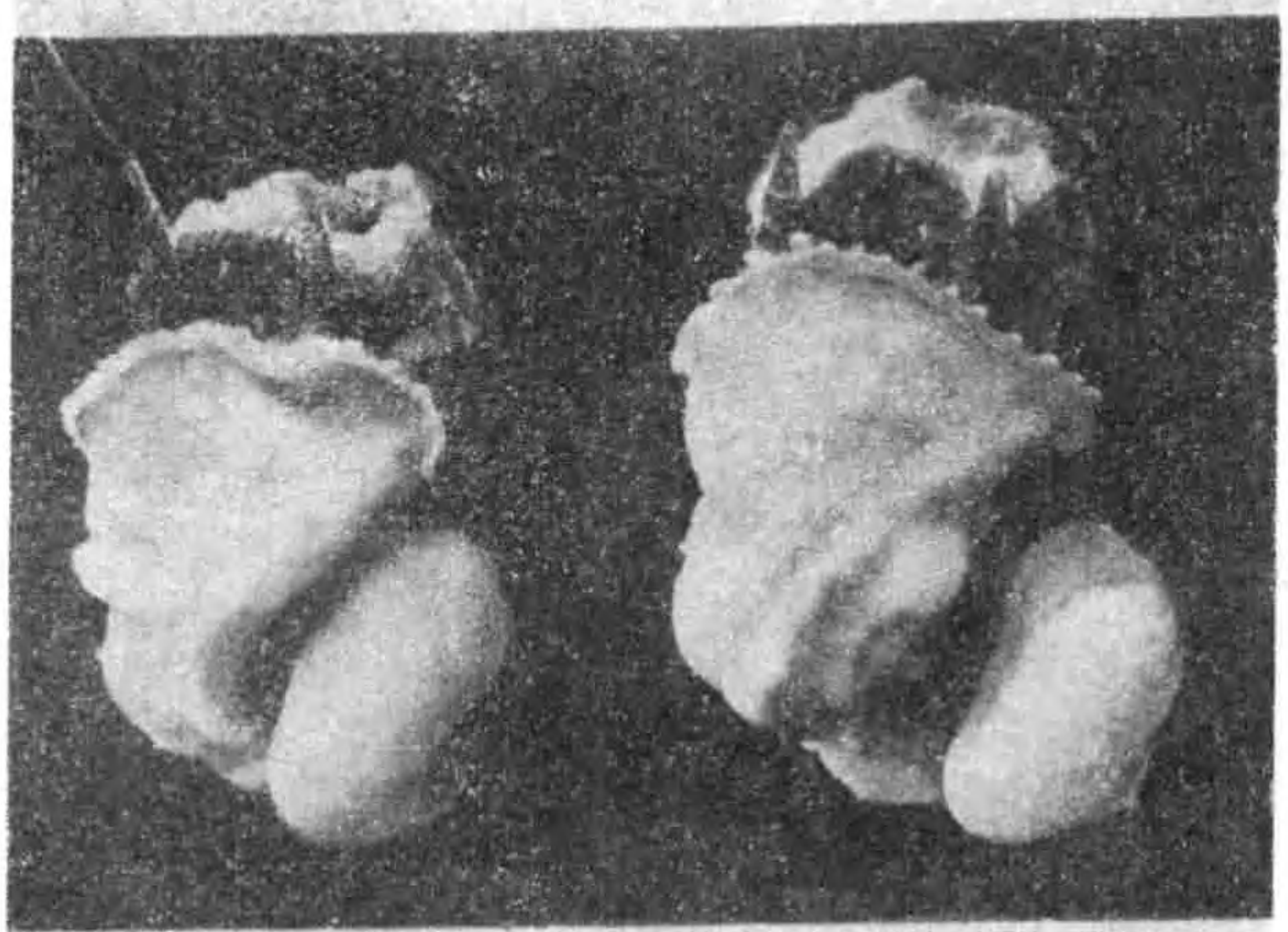

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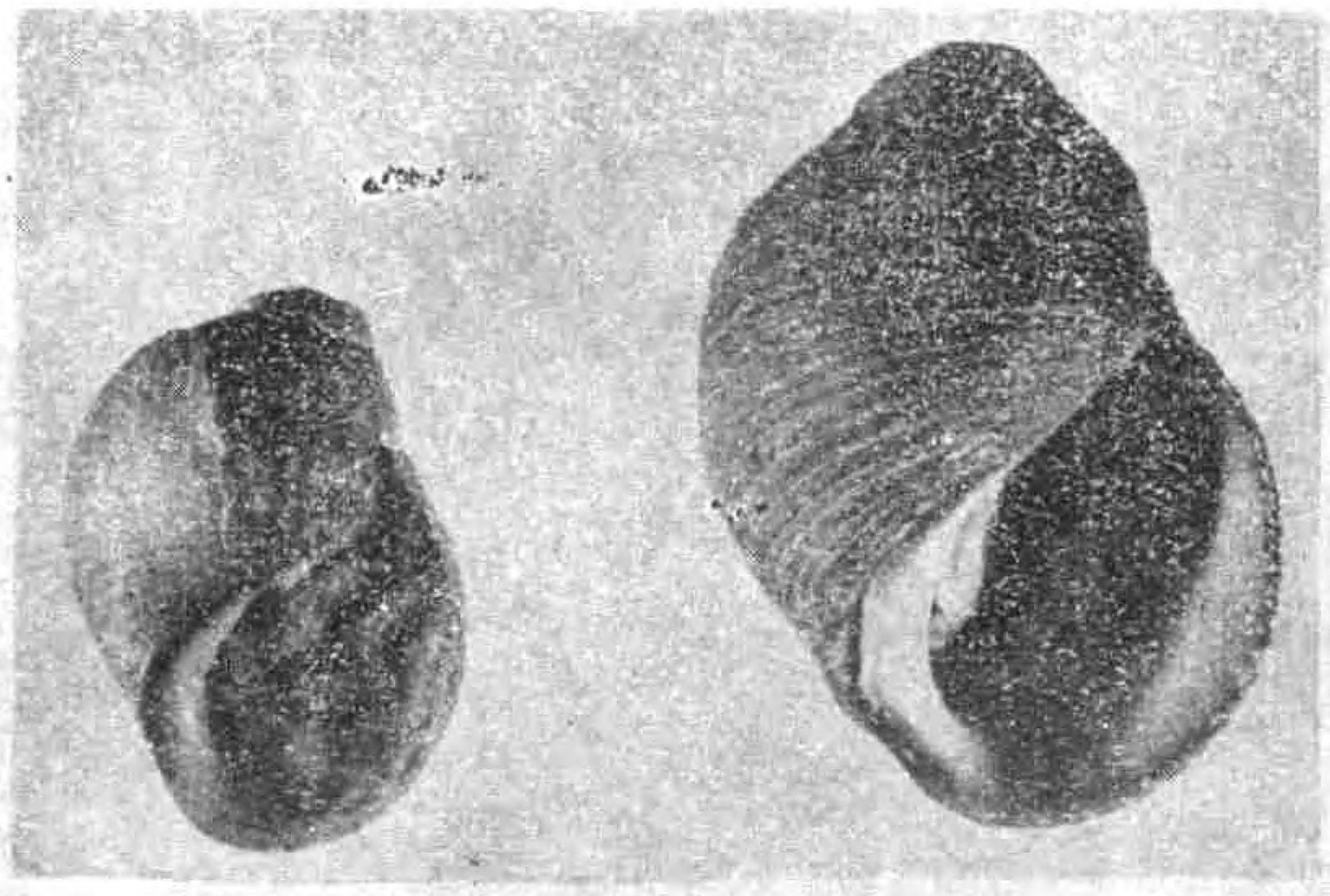

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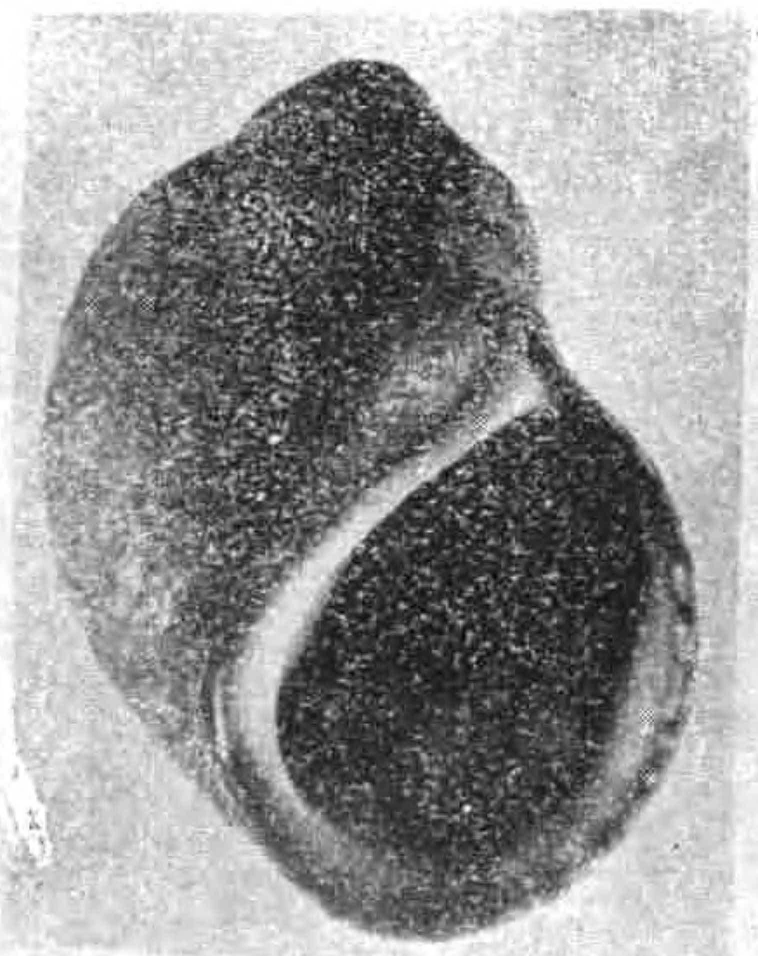

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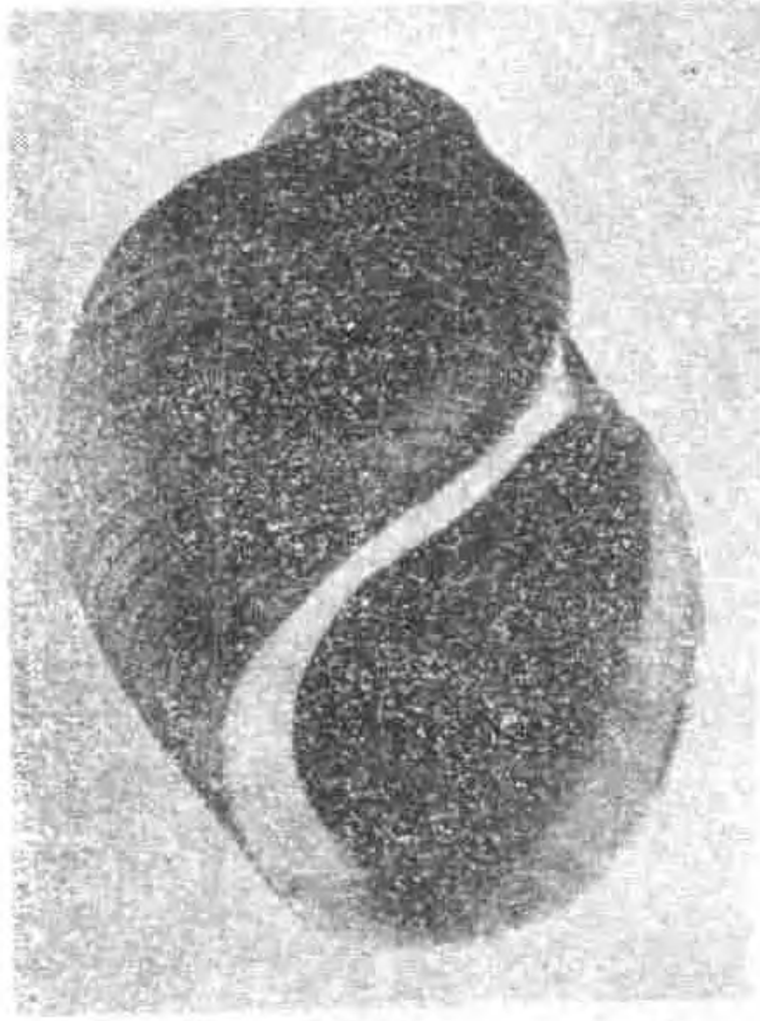

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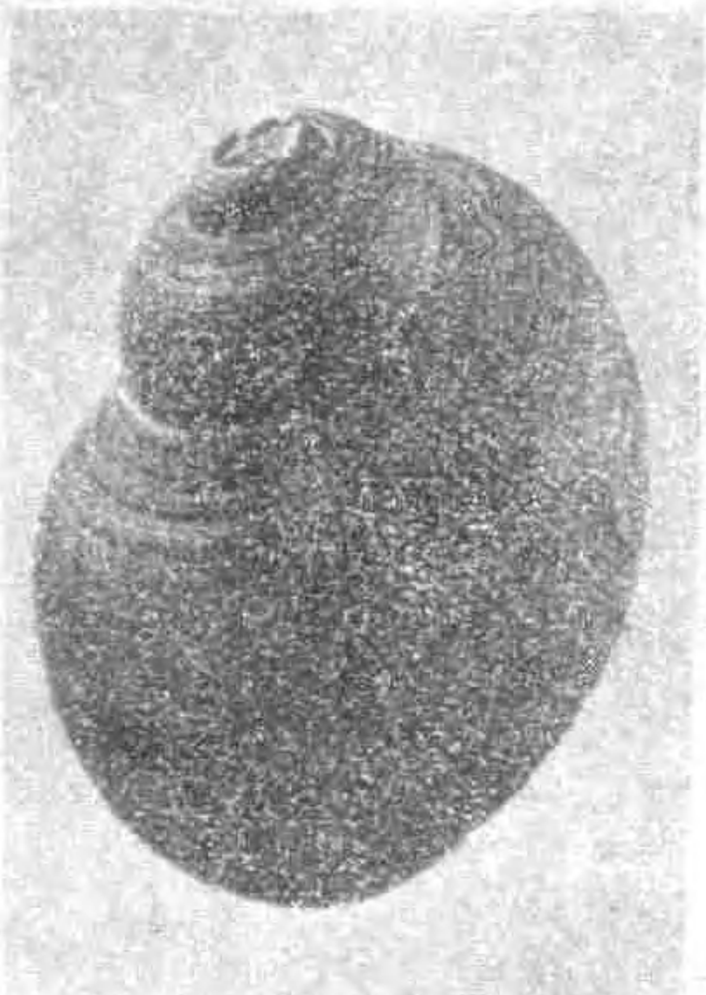

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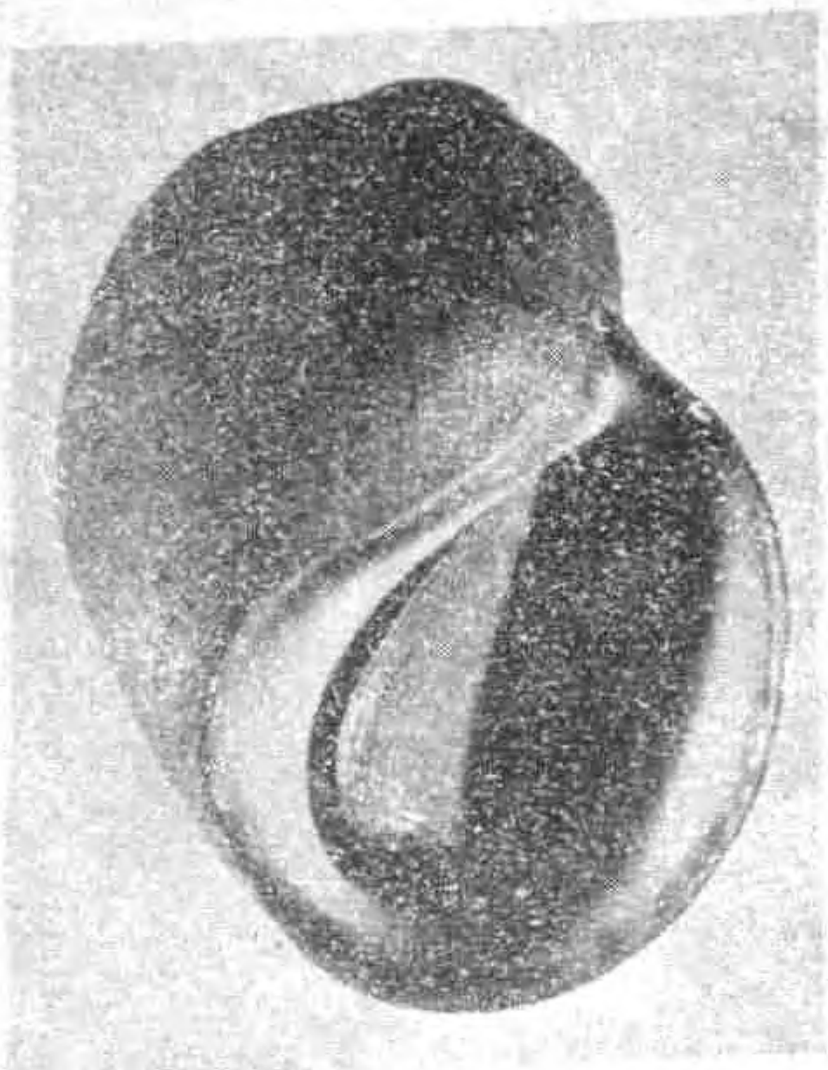

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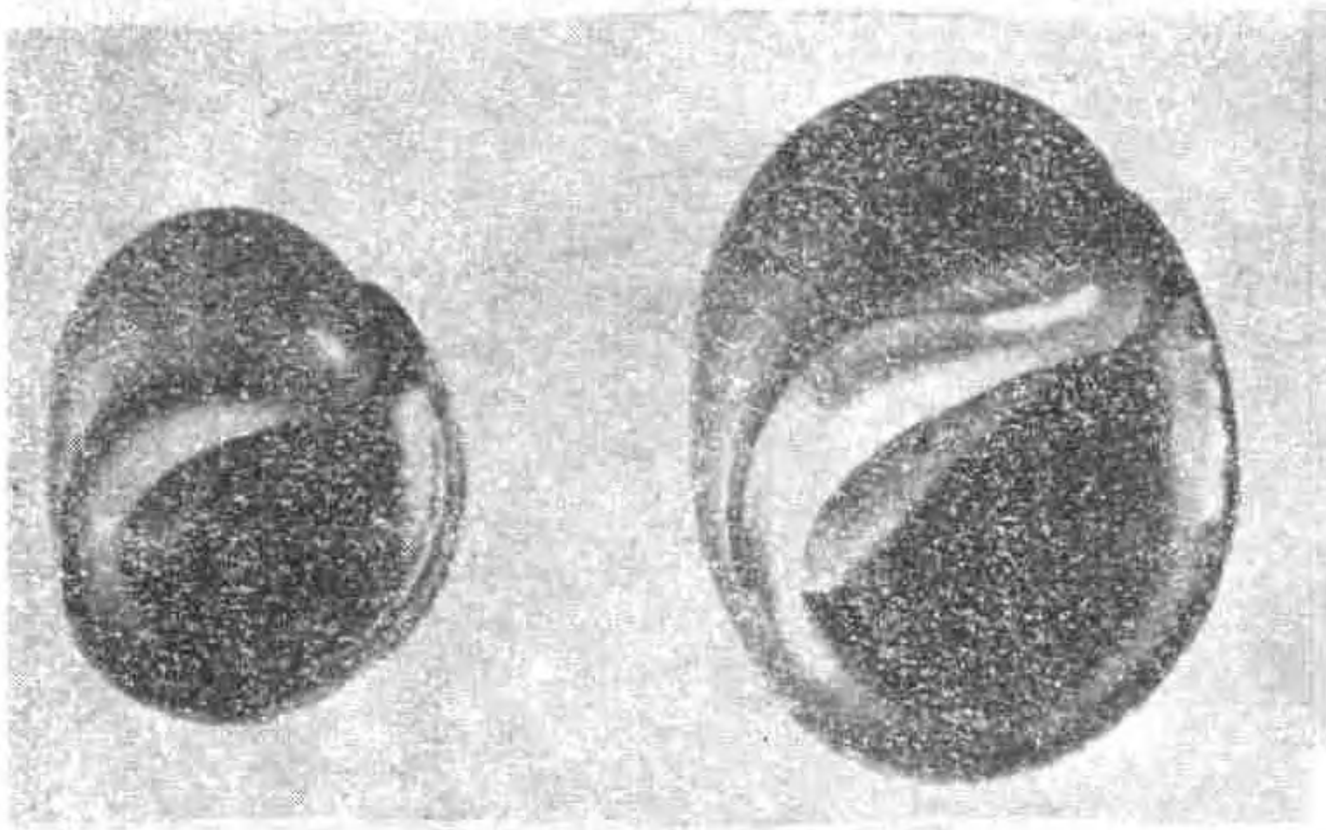

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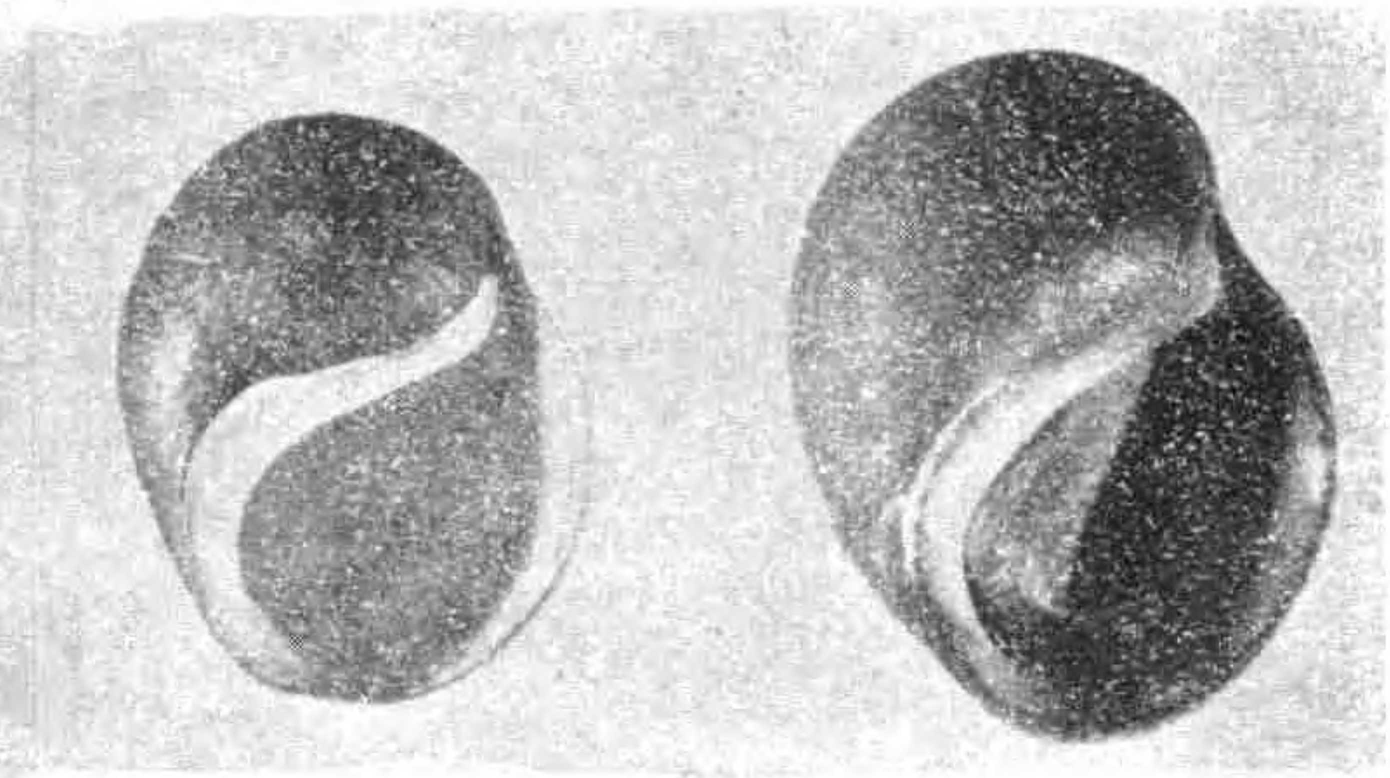

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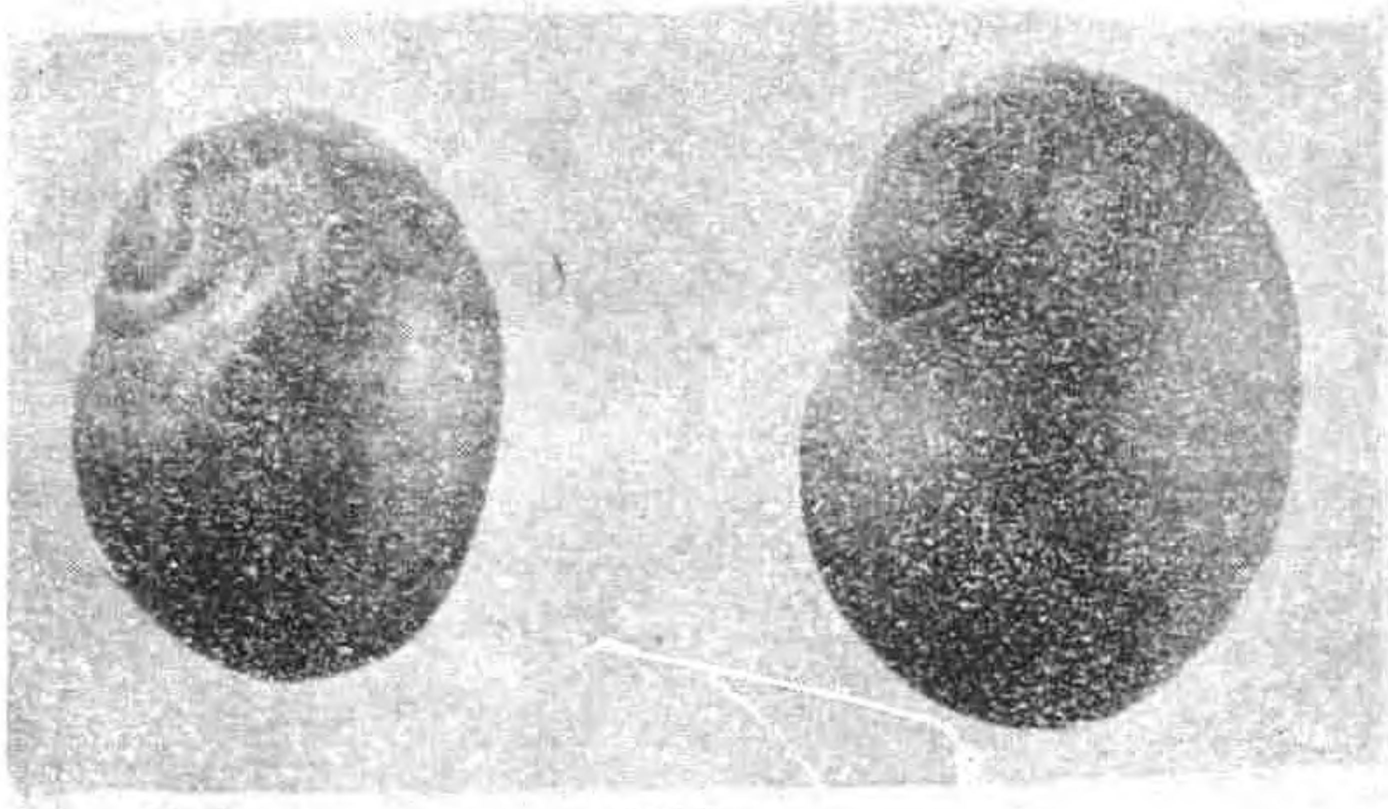

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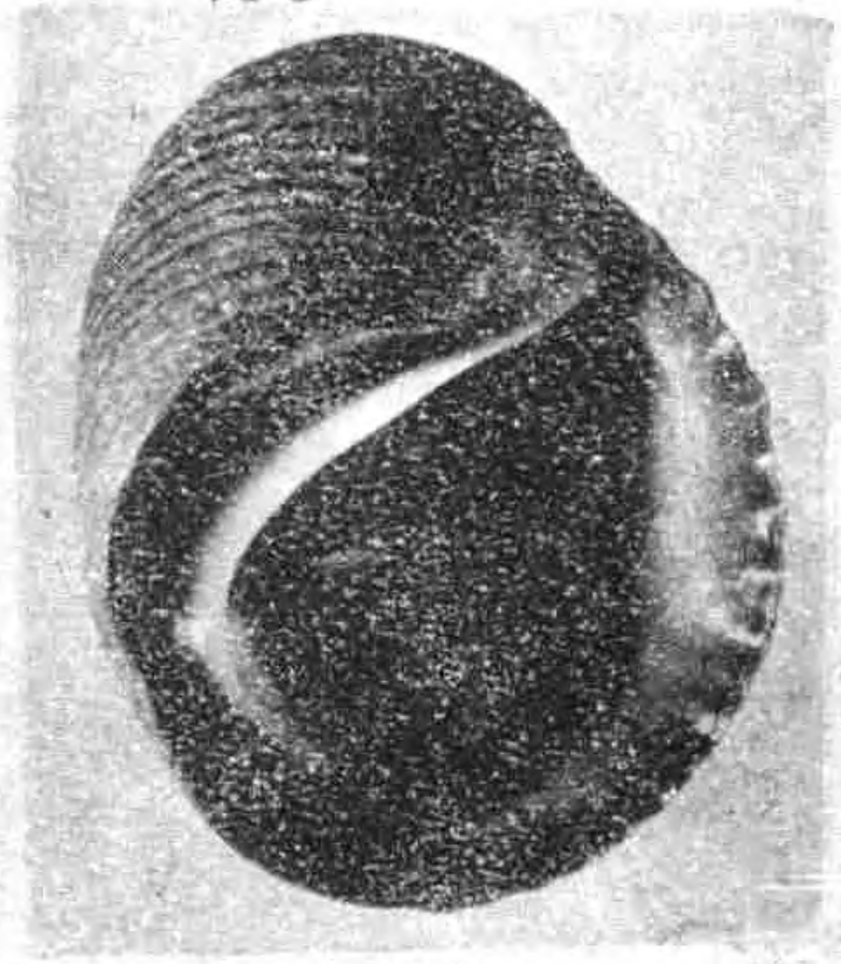

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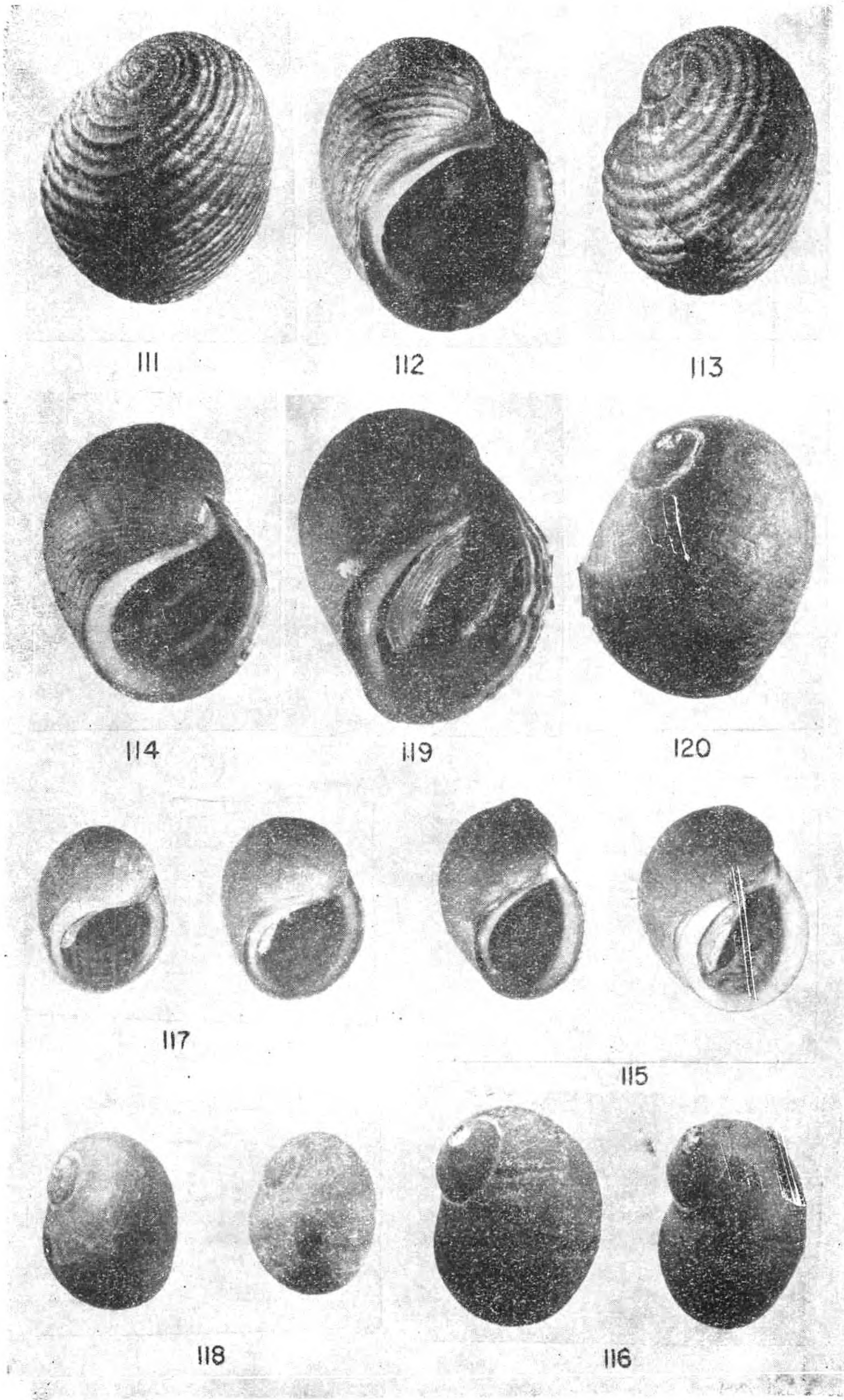
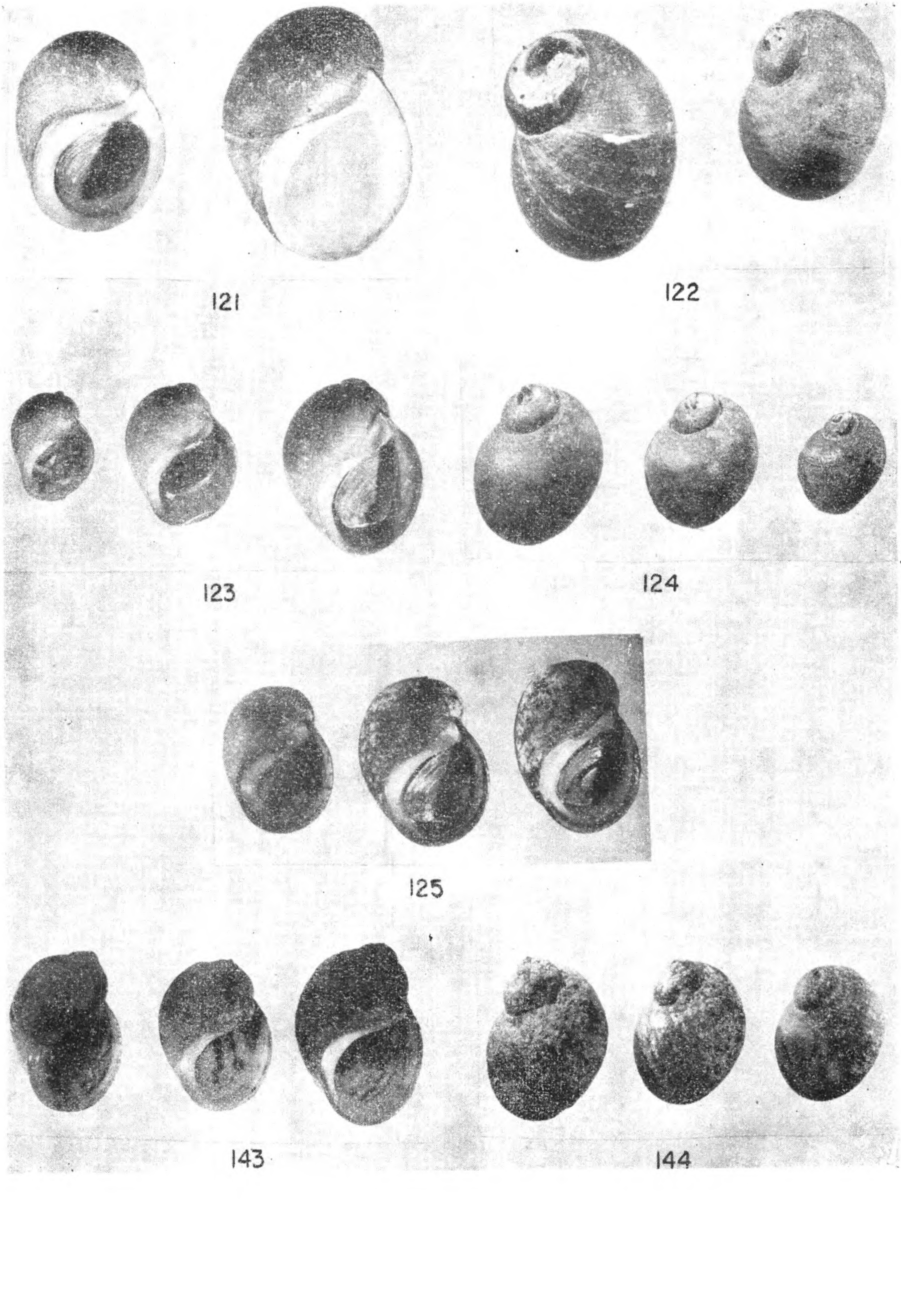
PLATE XI

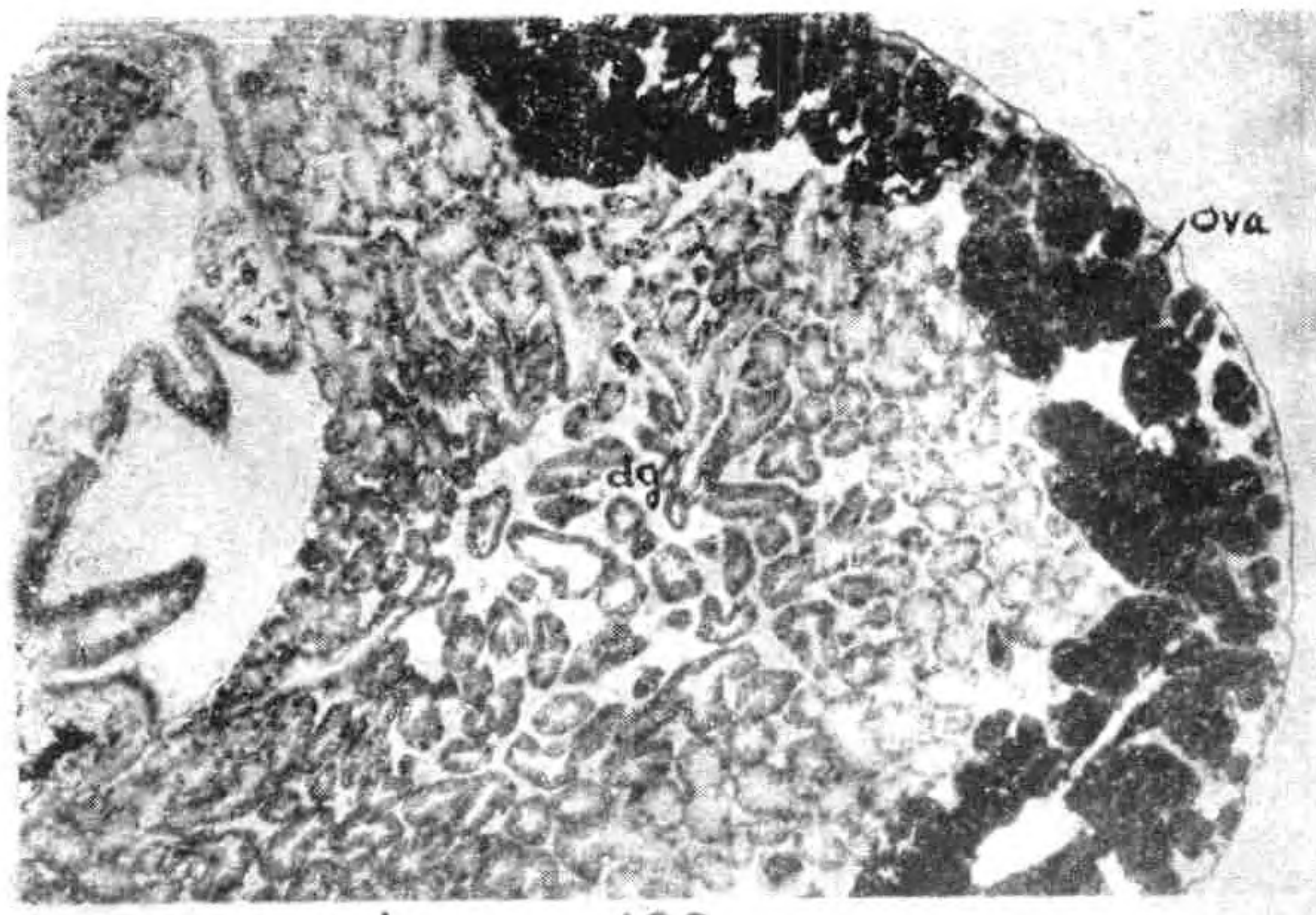




*Bull. Fish. Res. Stn., Sri Lanka (Ceylon), Vol. 25, Nos. 1 and 2, 1974* PLATE XII





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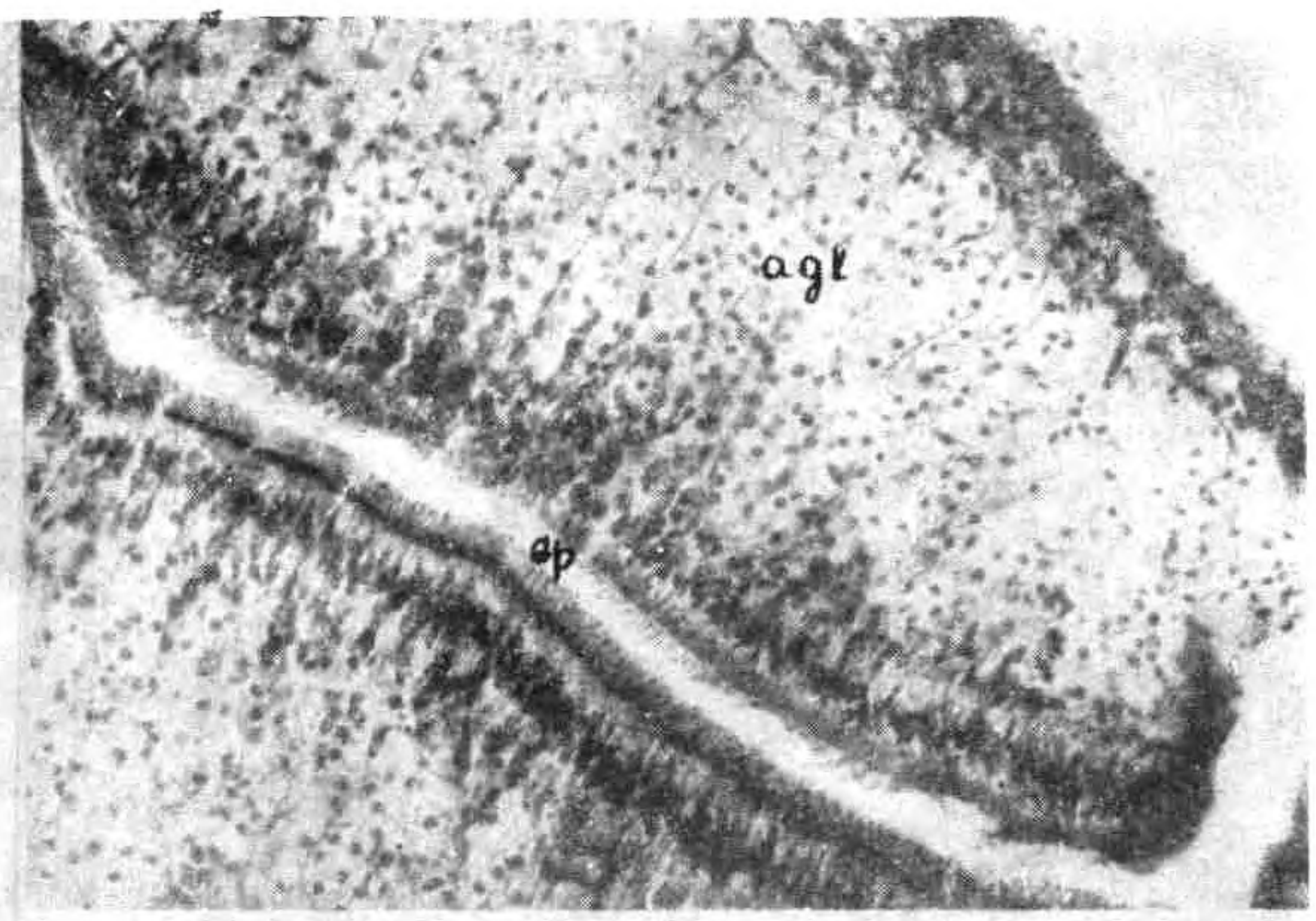


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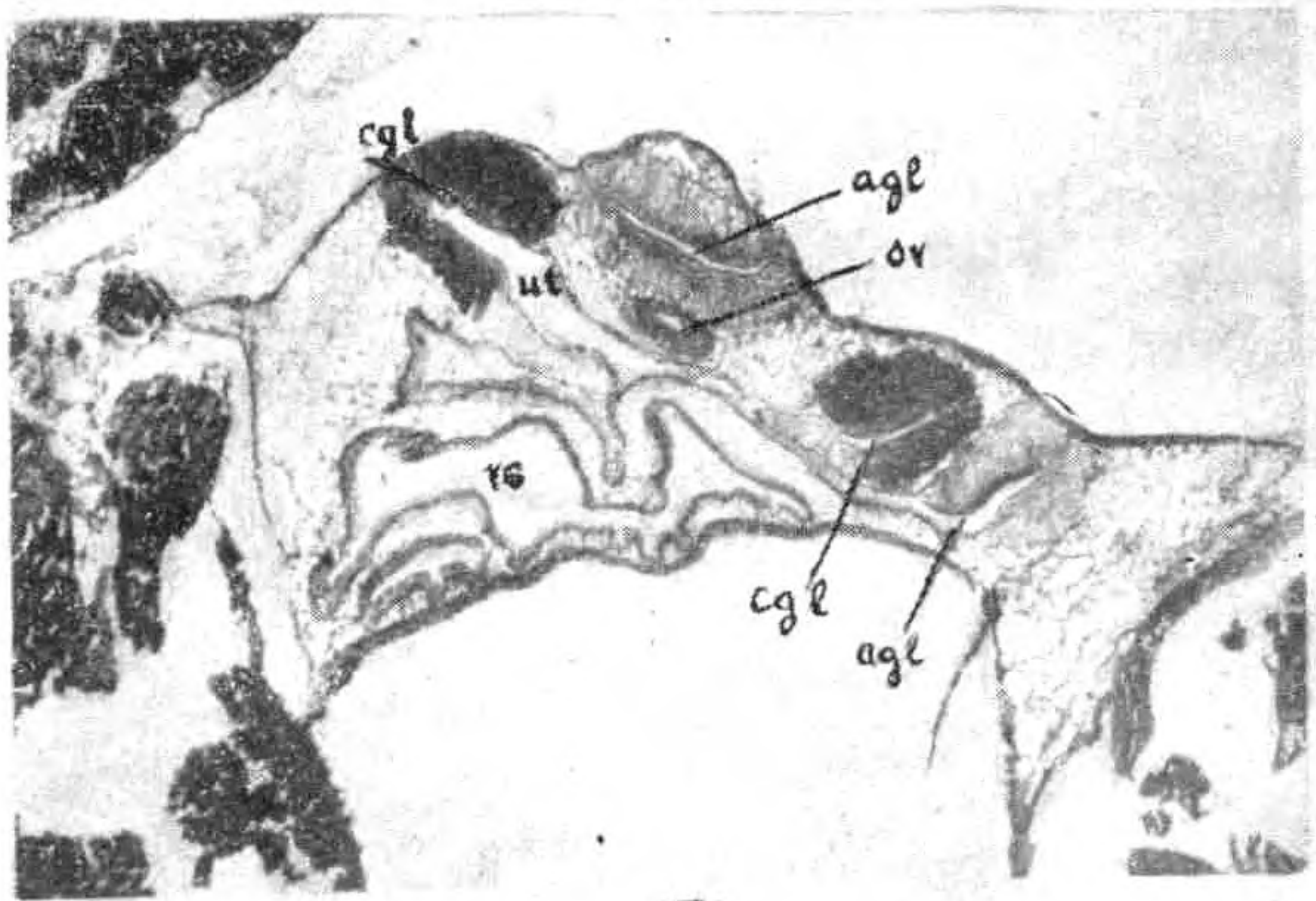


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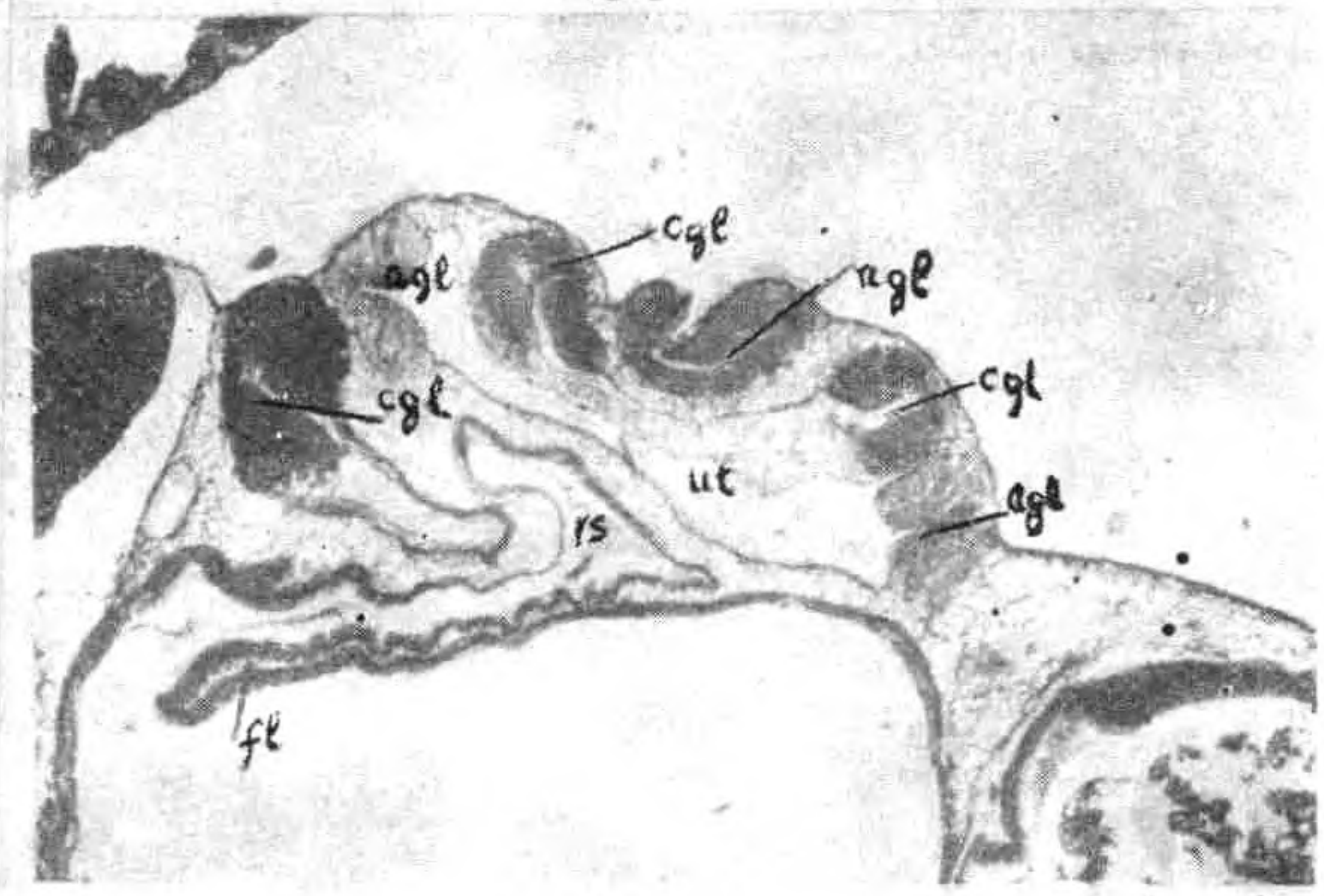


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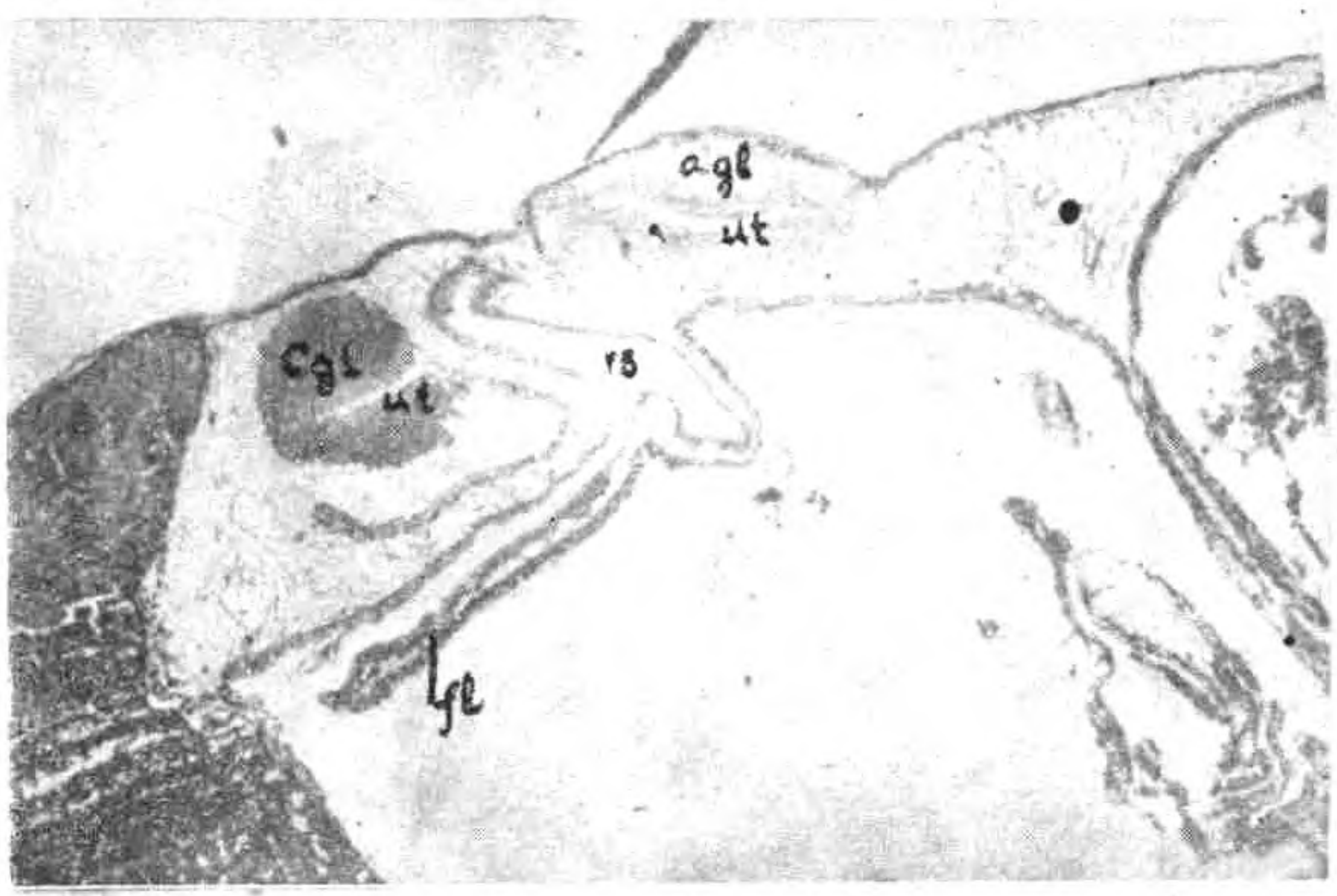


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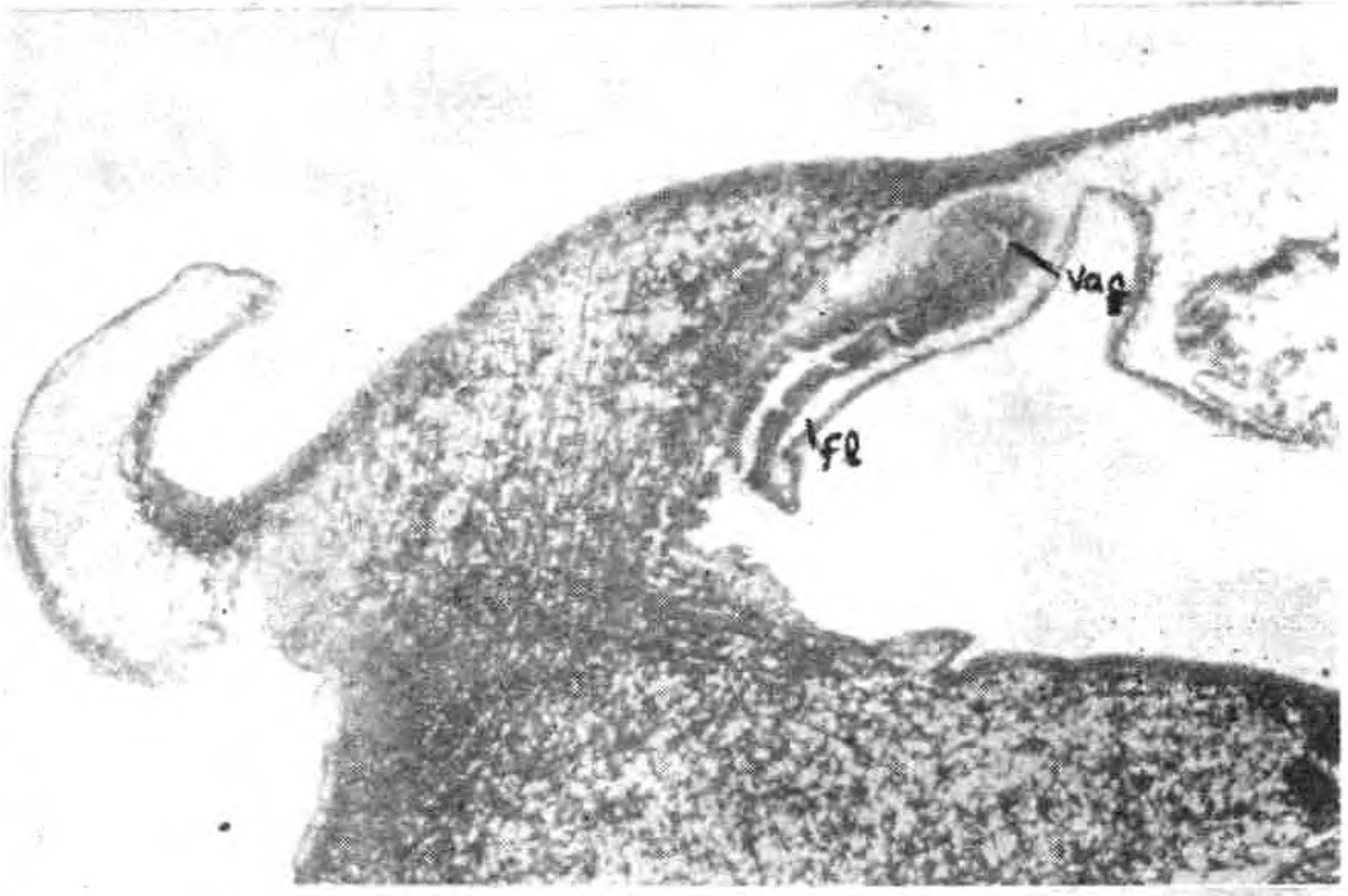


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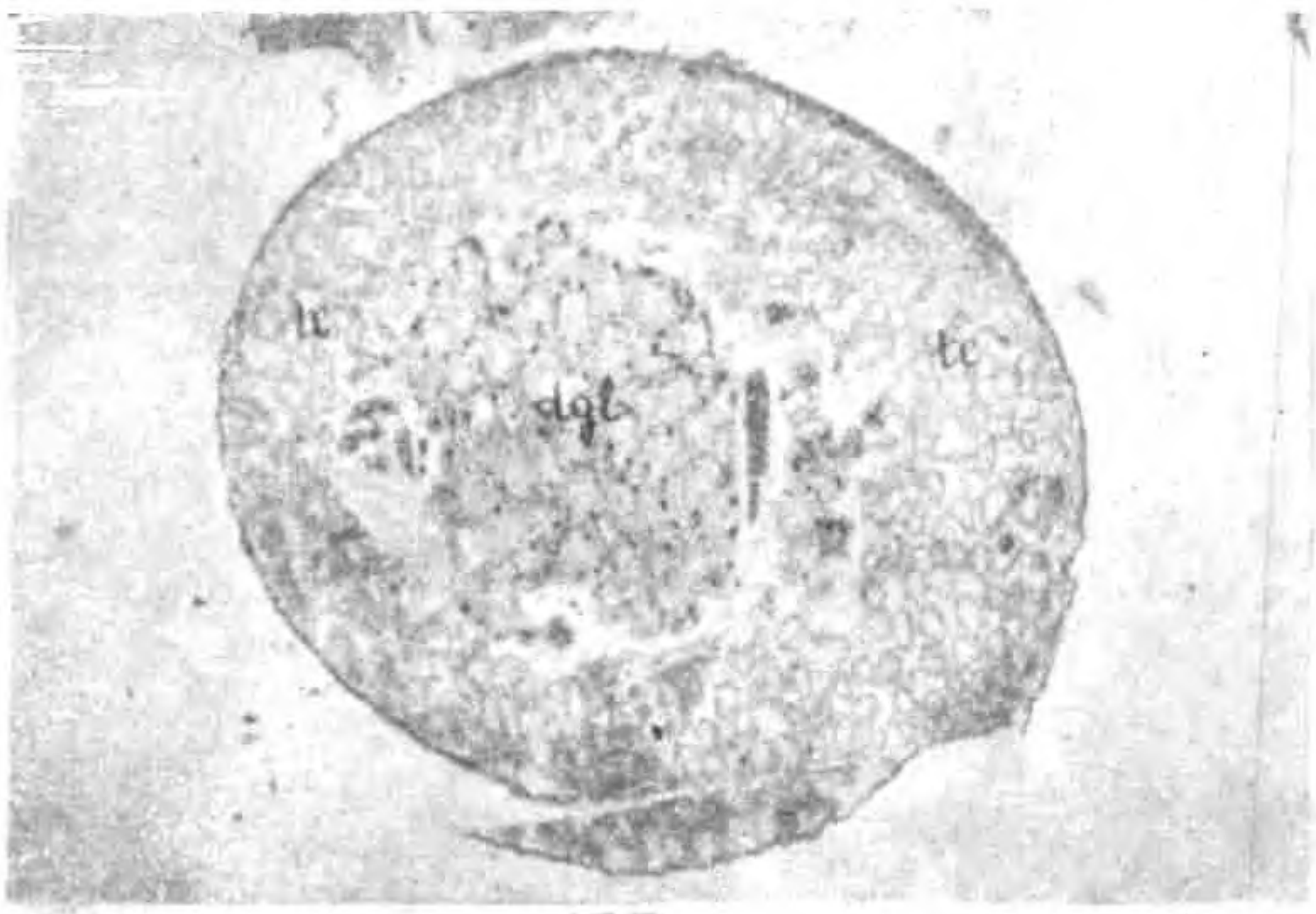

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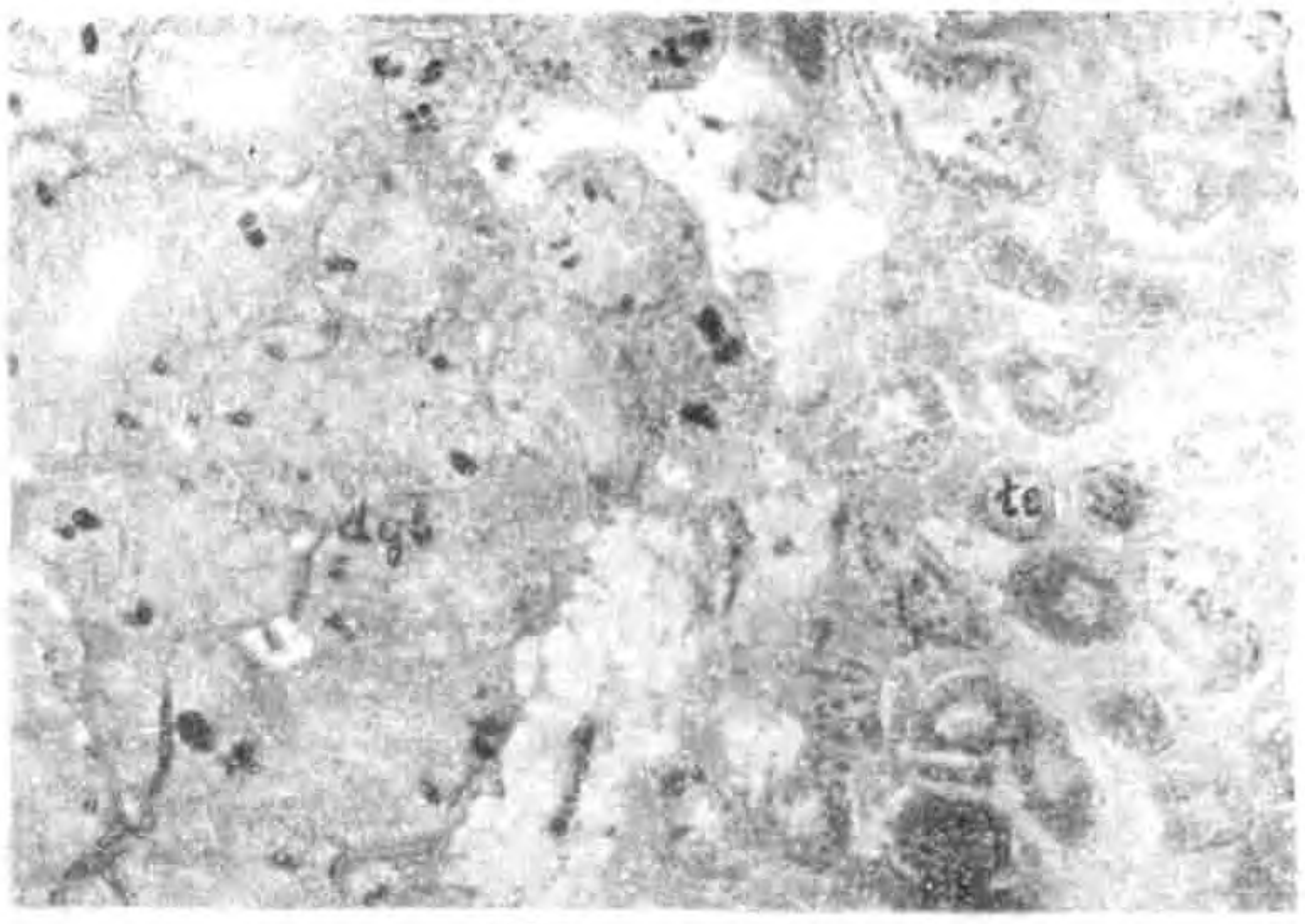

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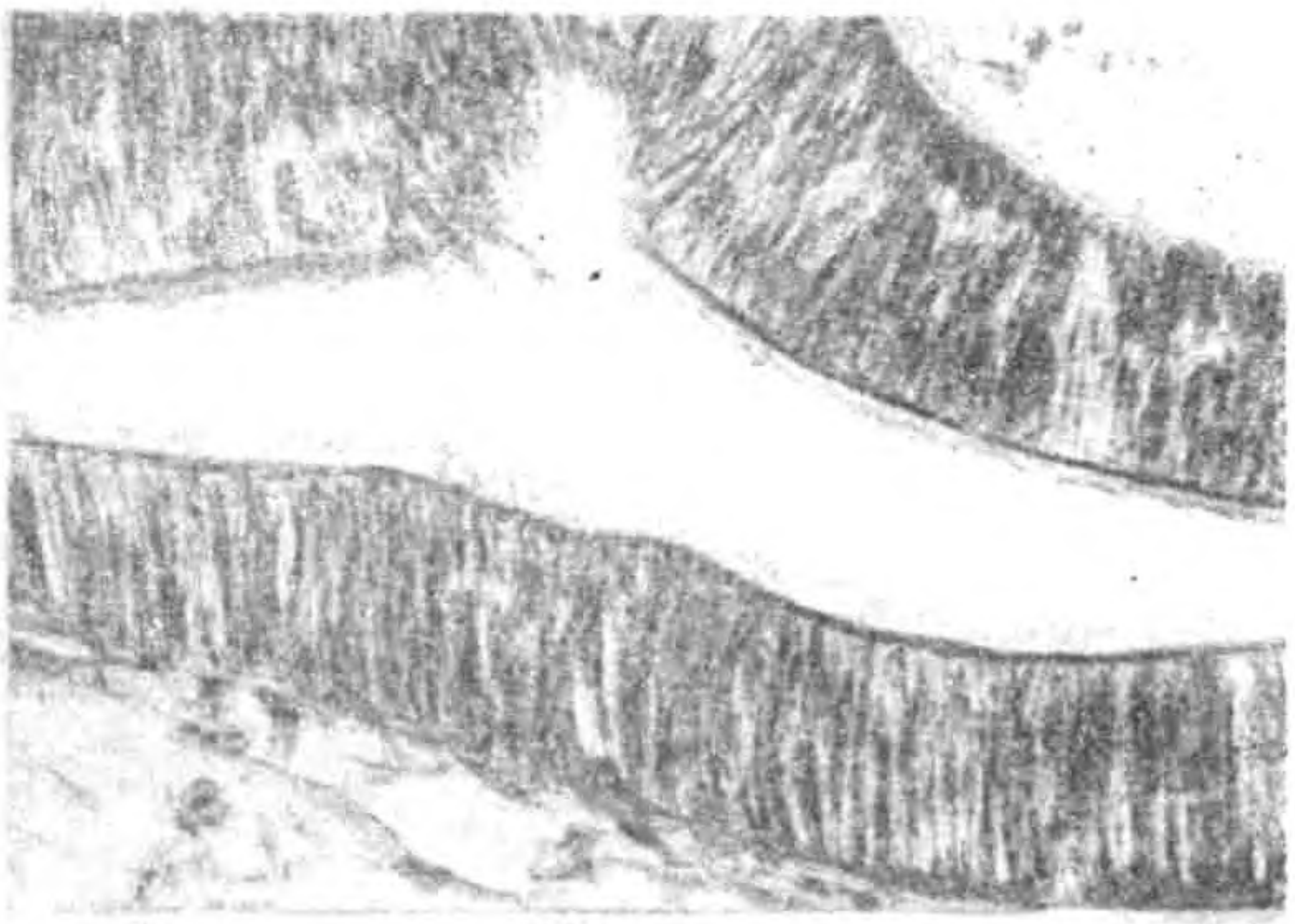

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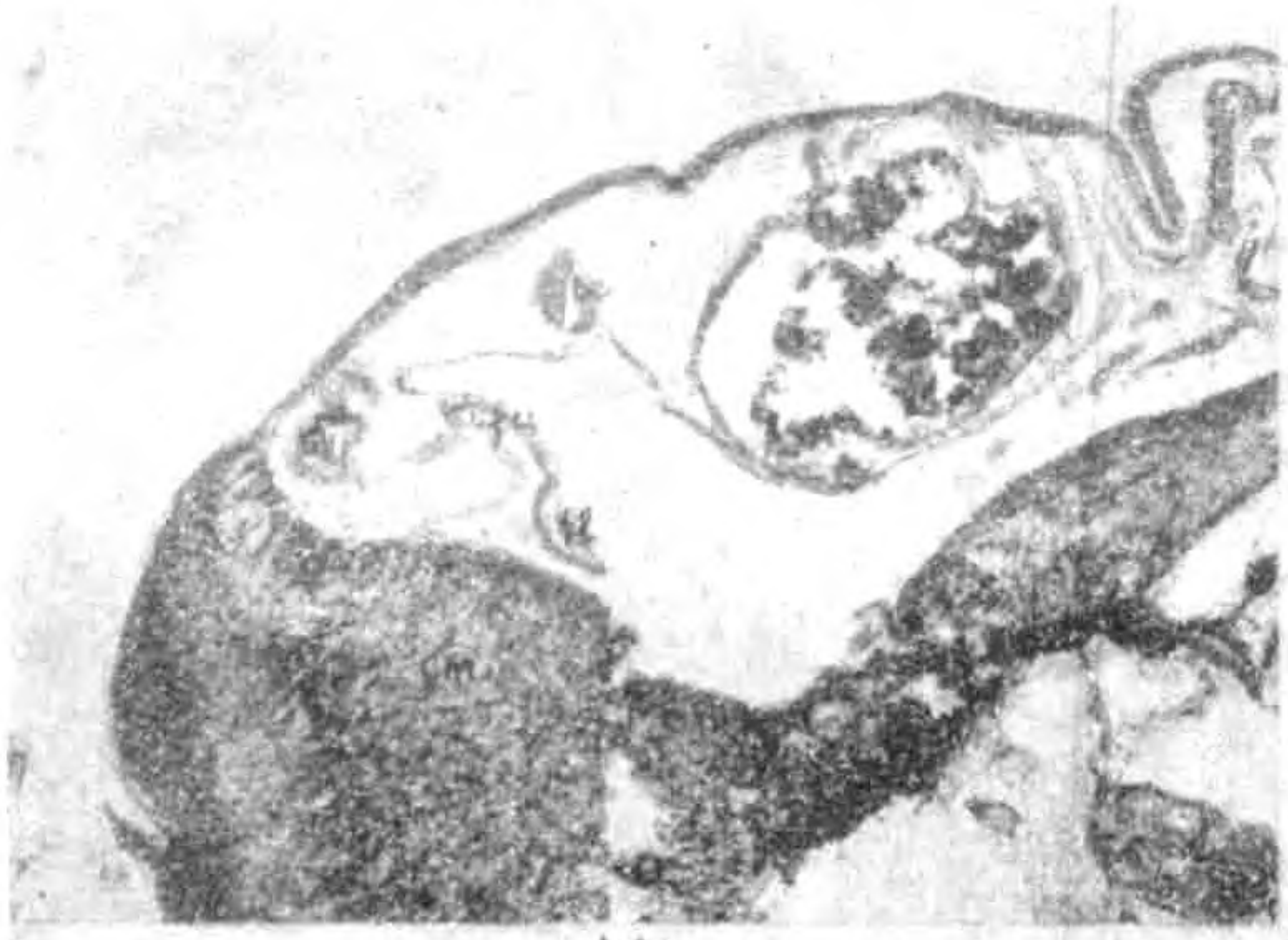

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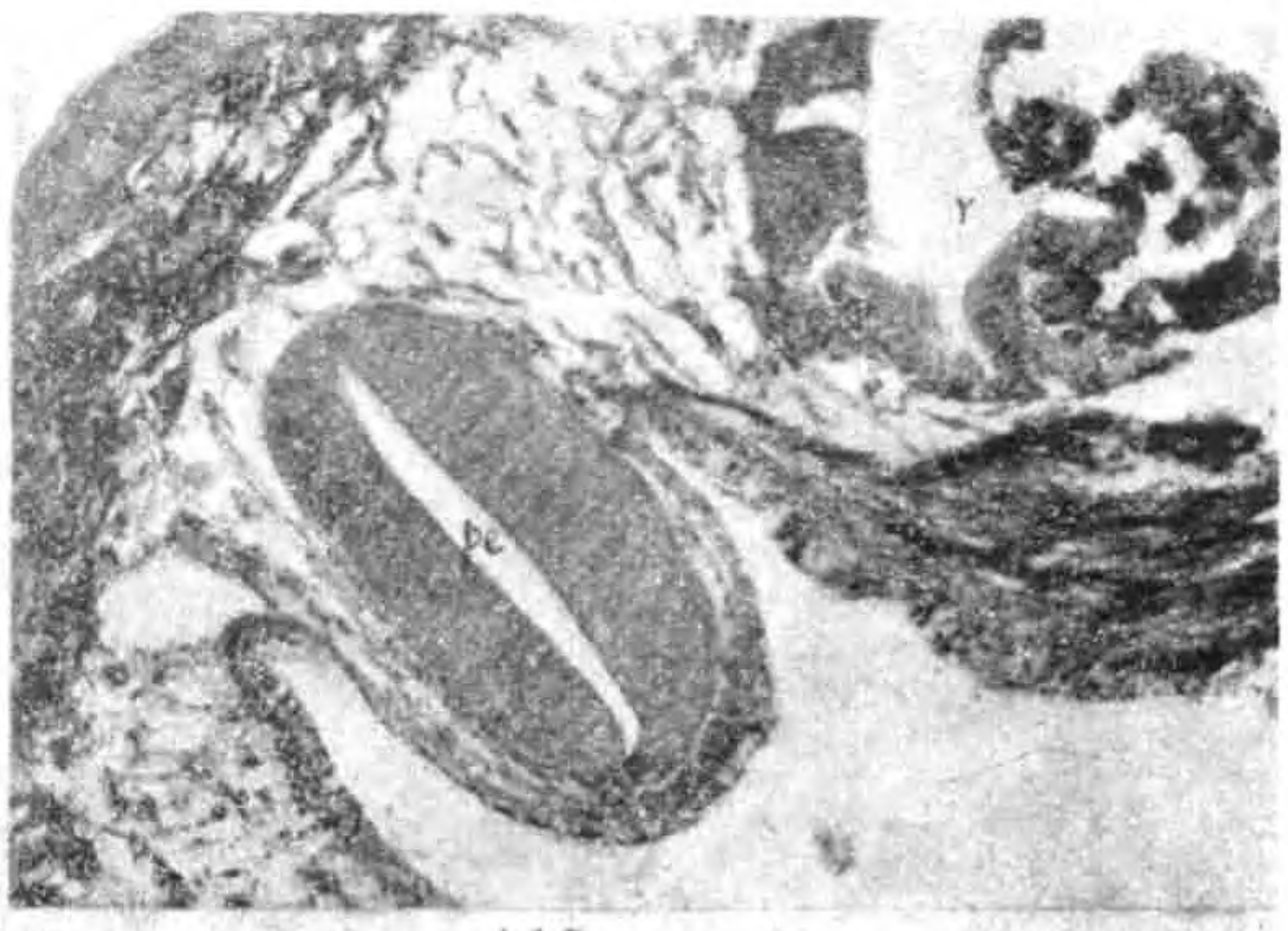

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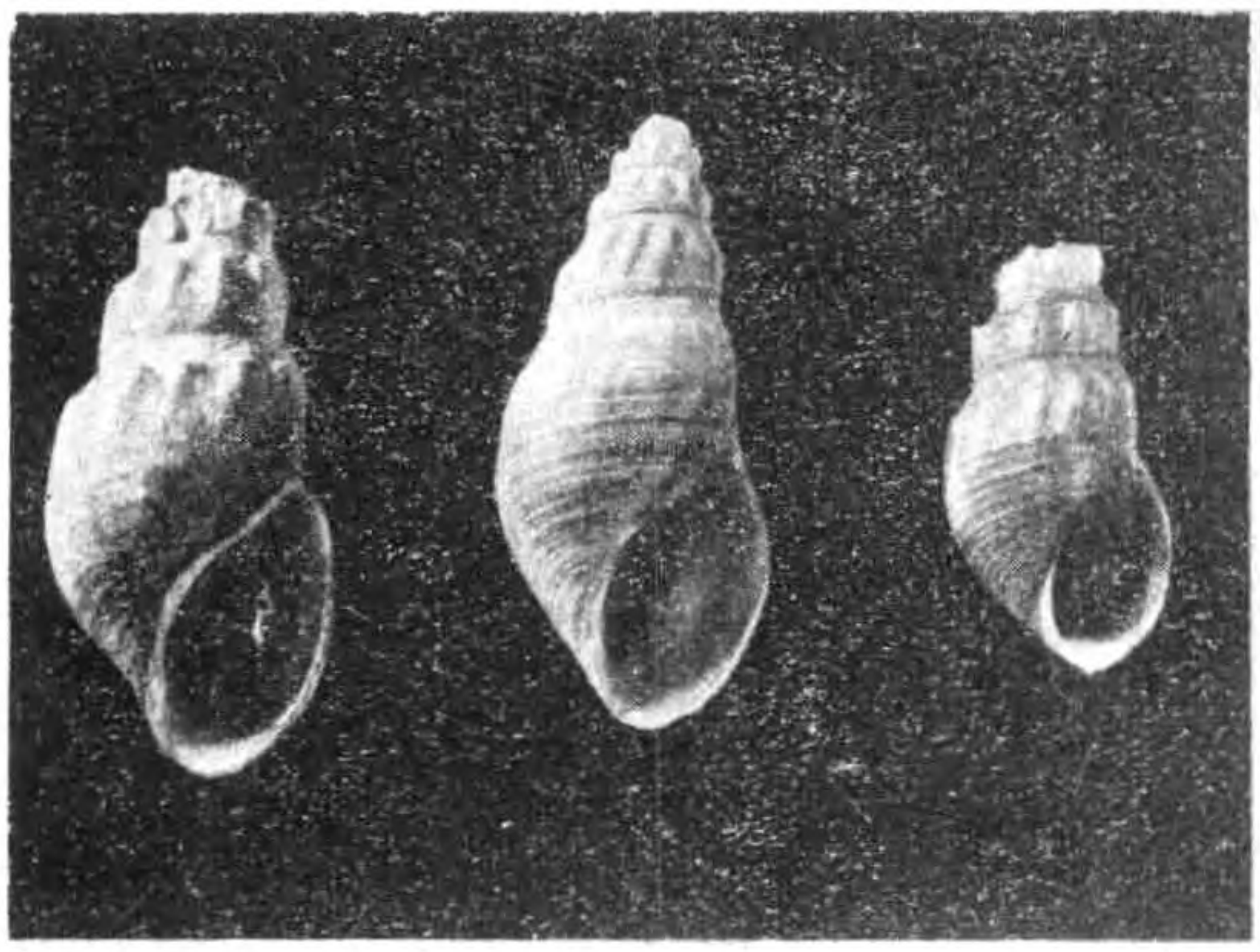

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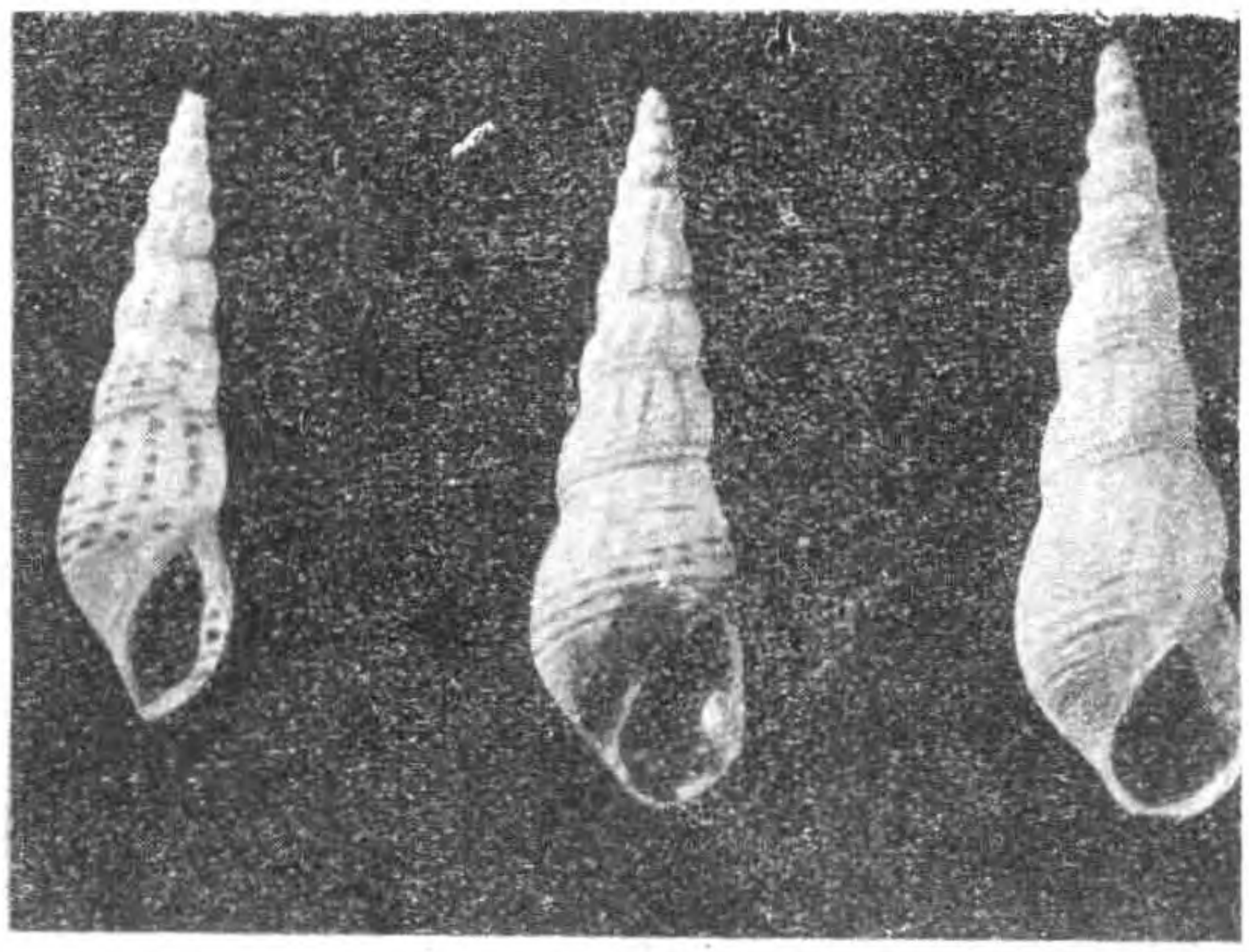

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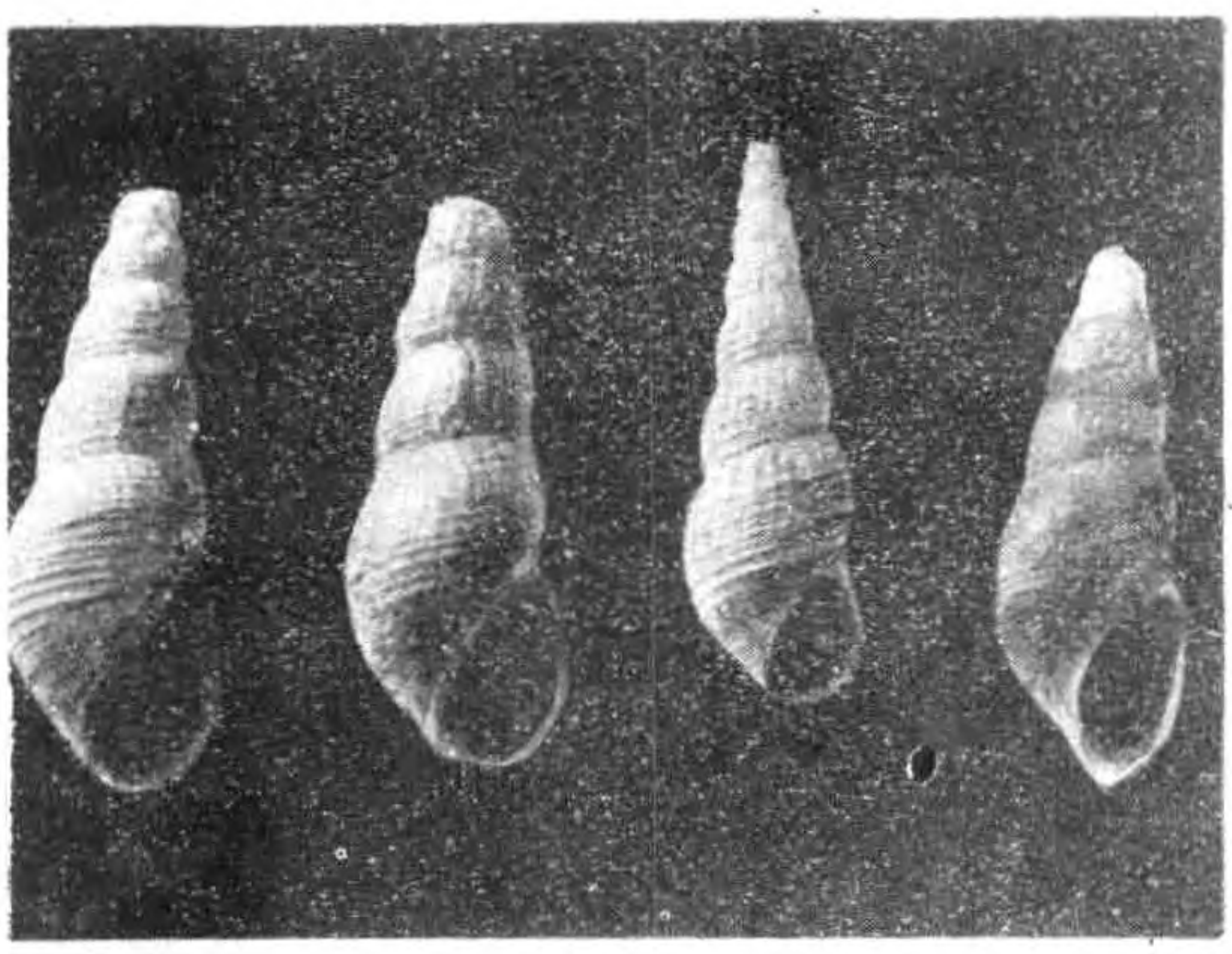

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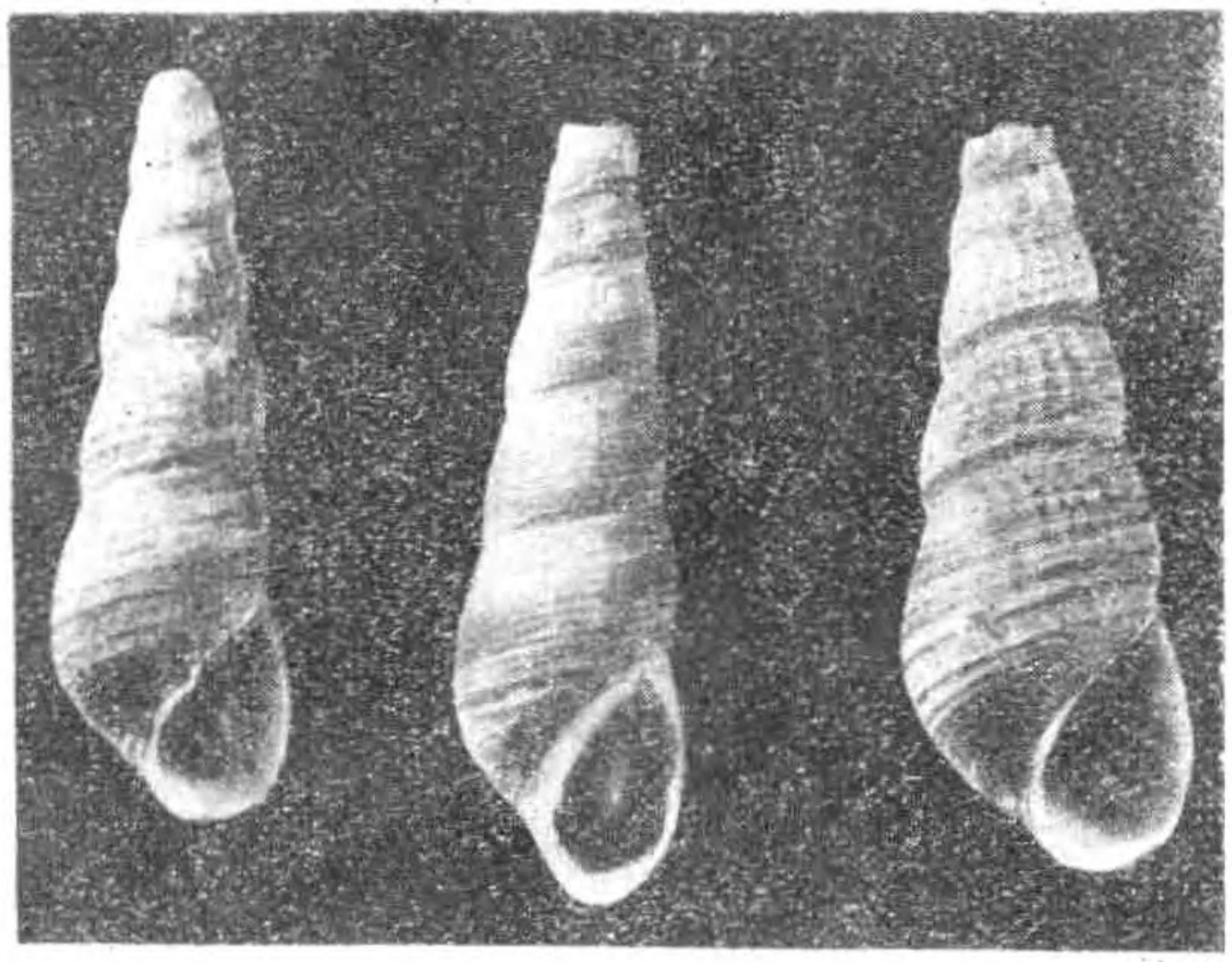

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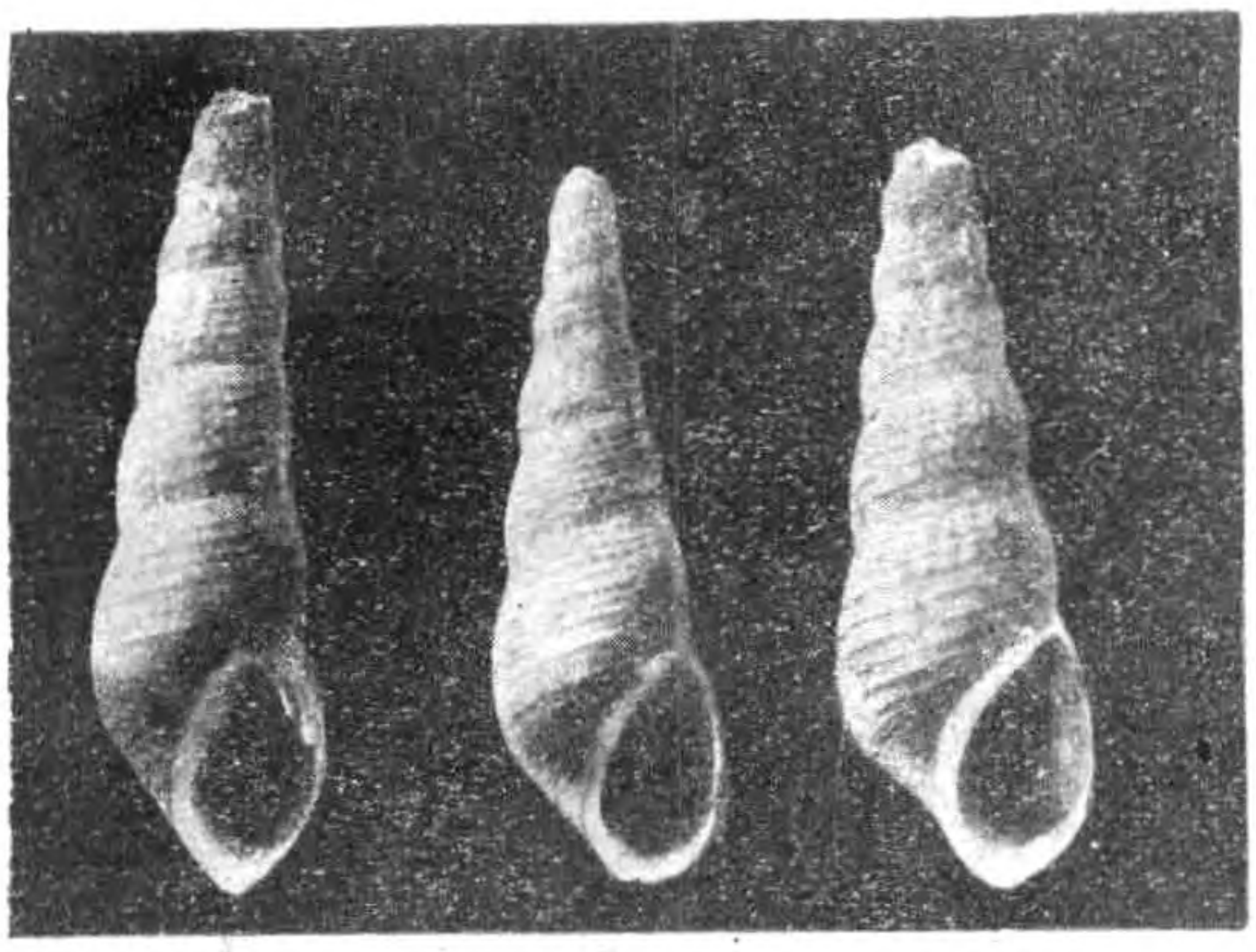

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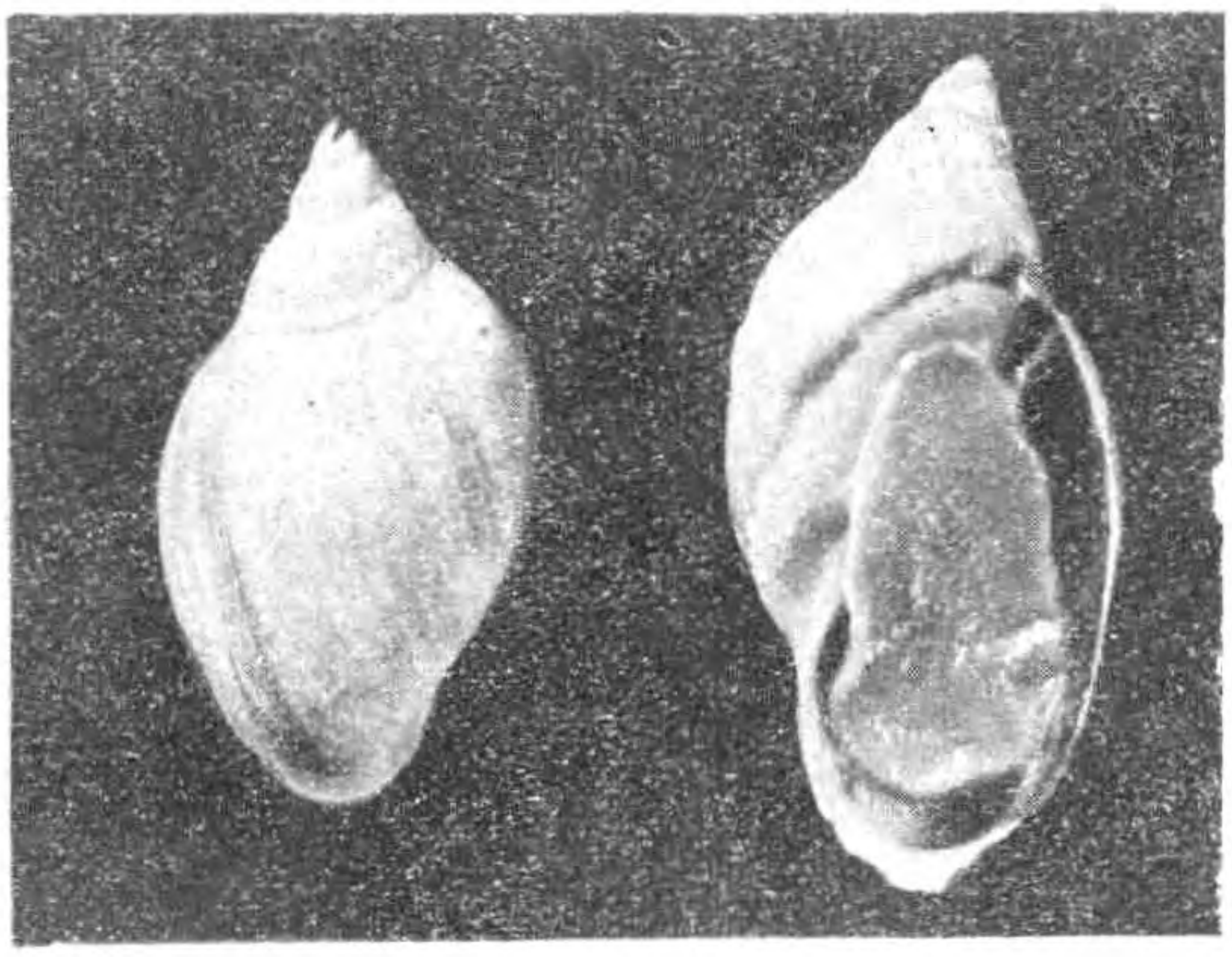

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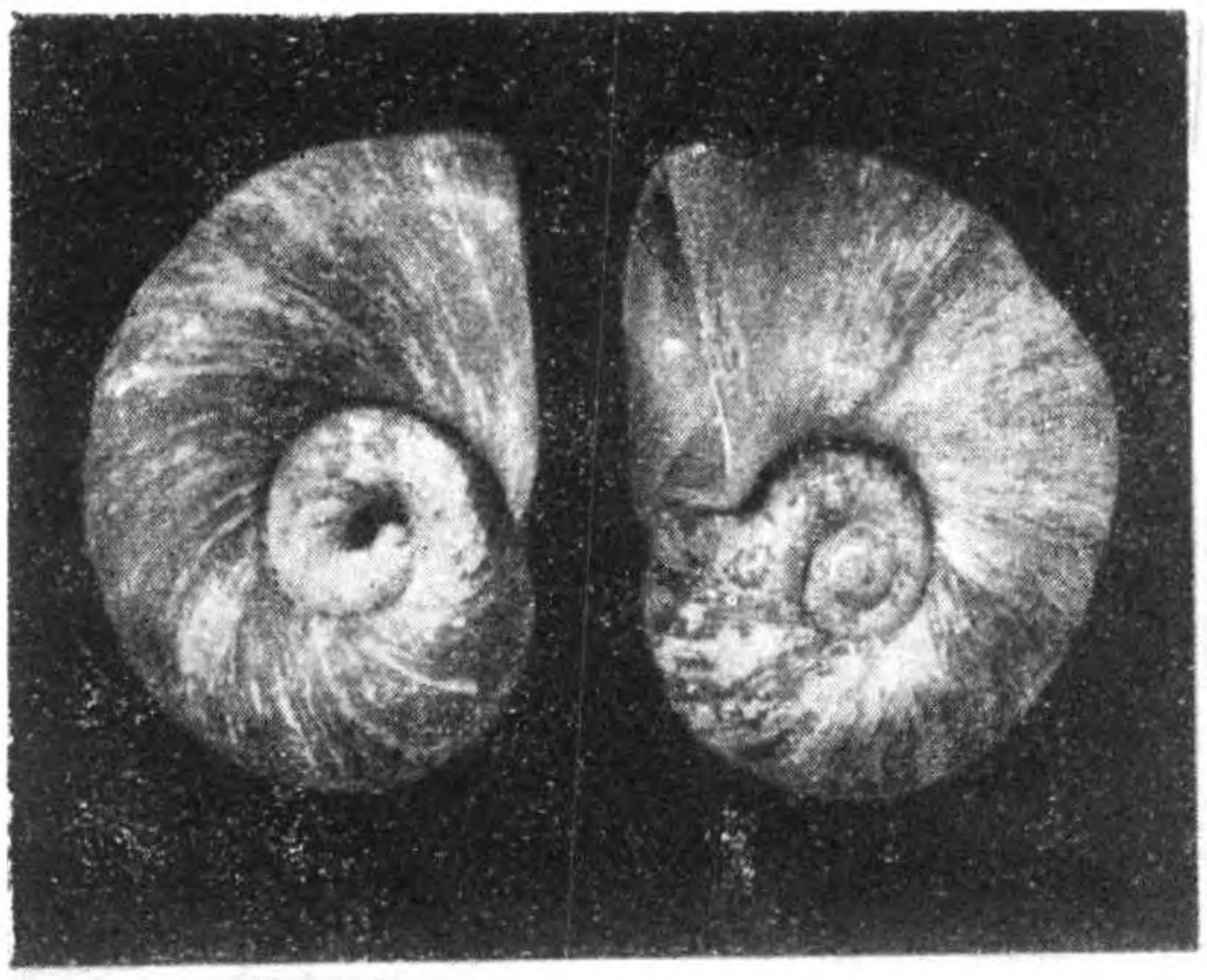

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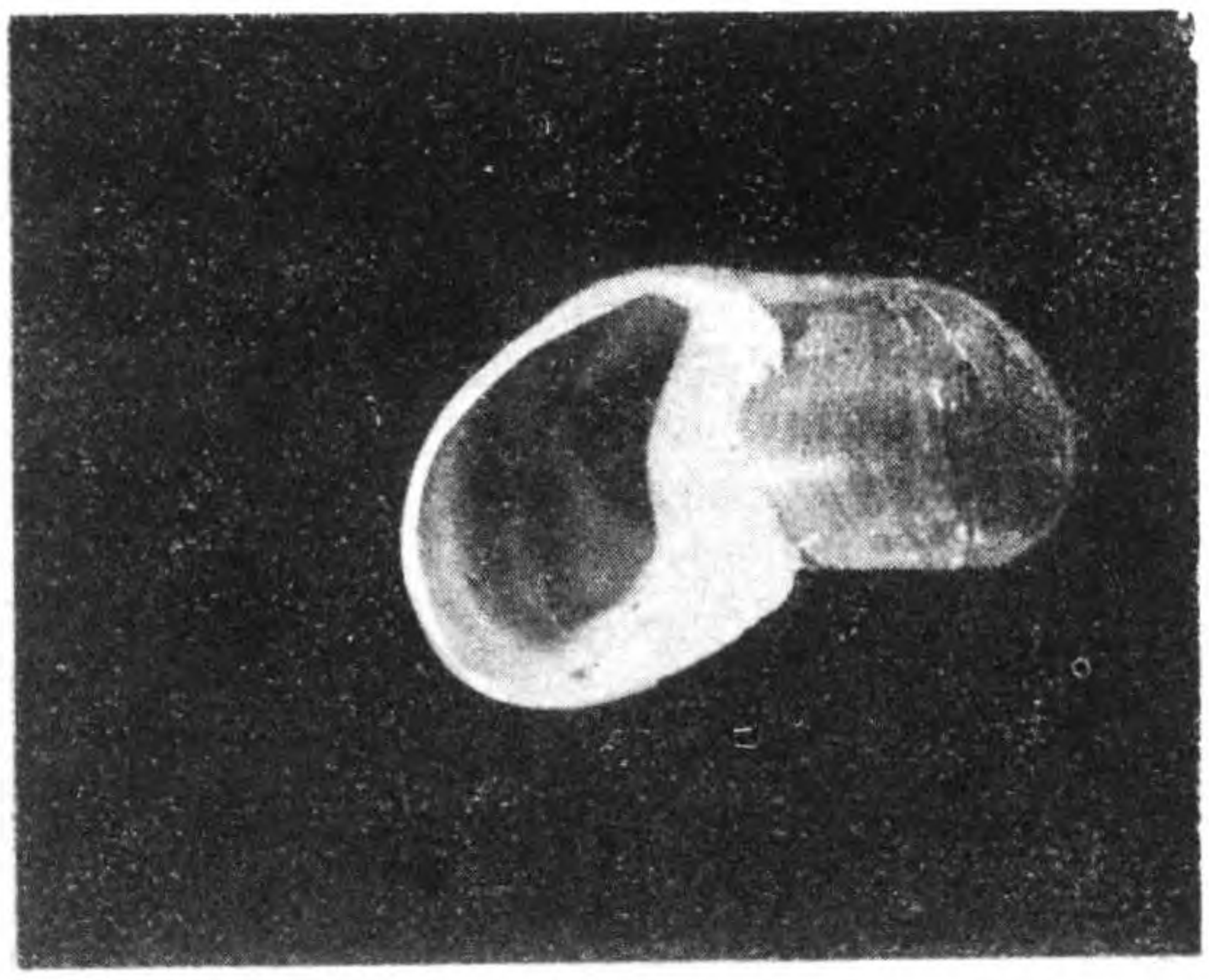

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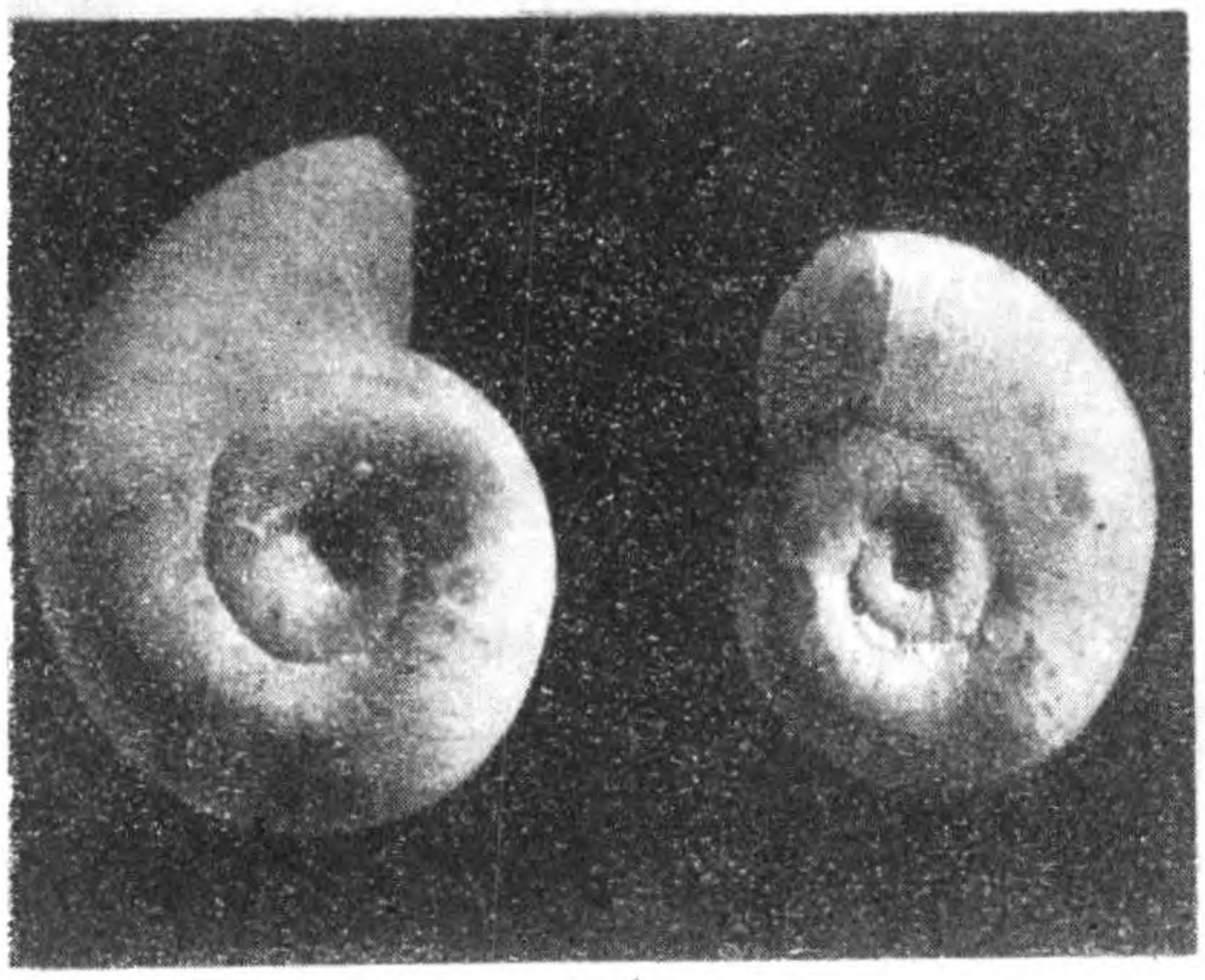

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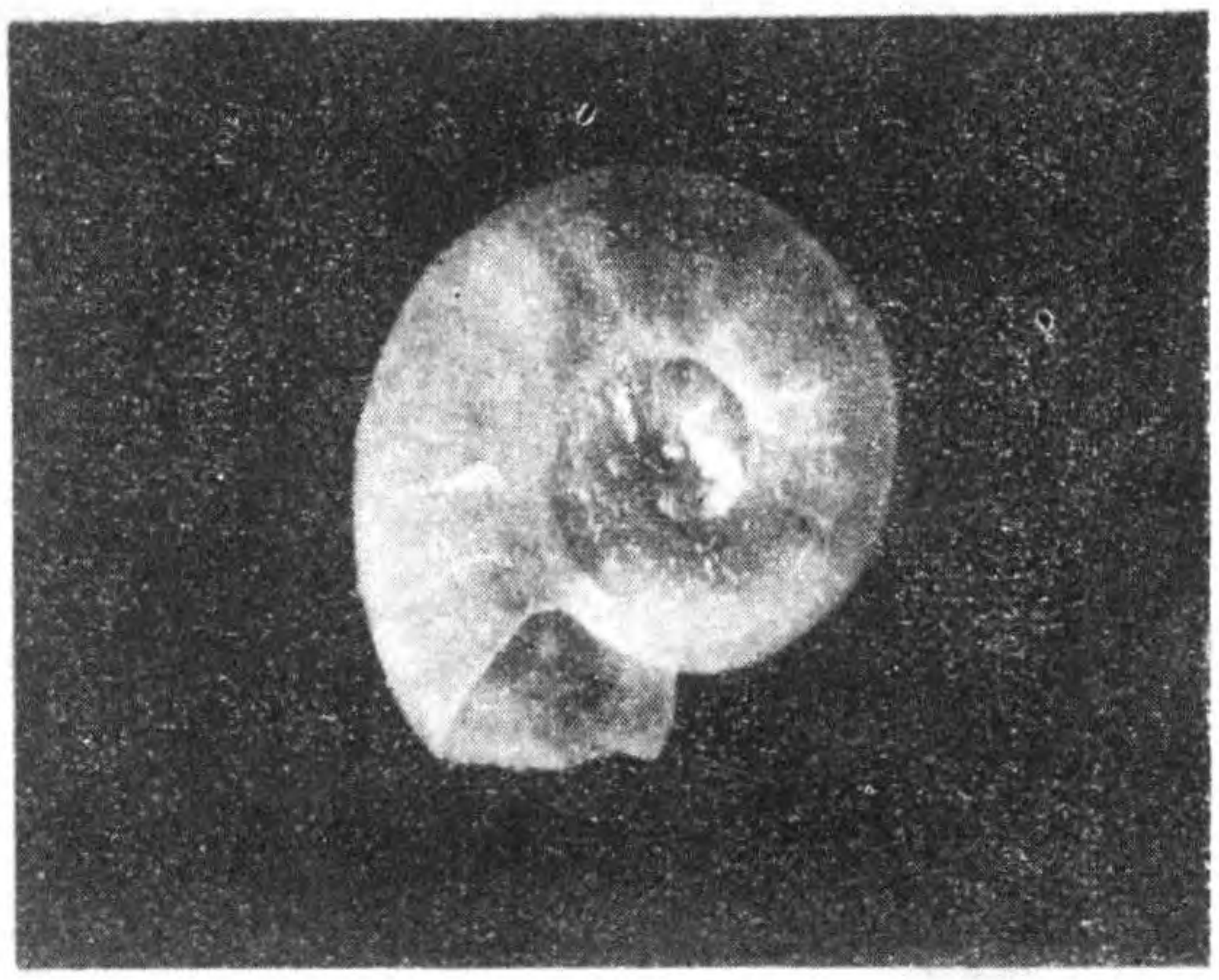

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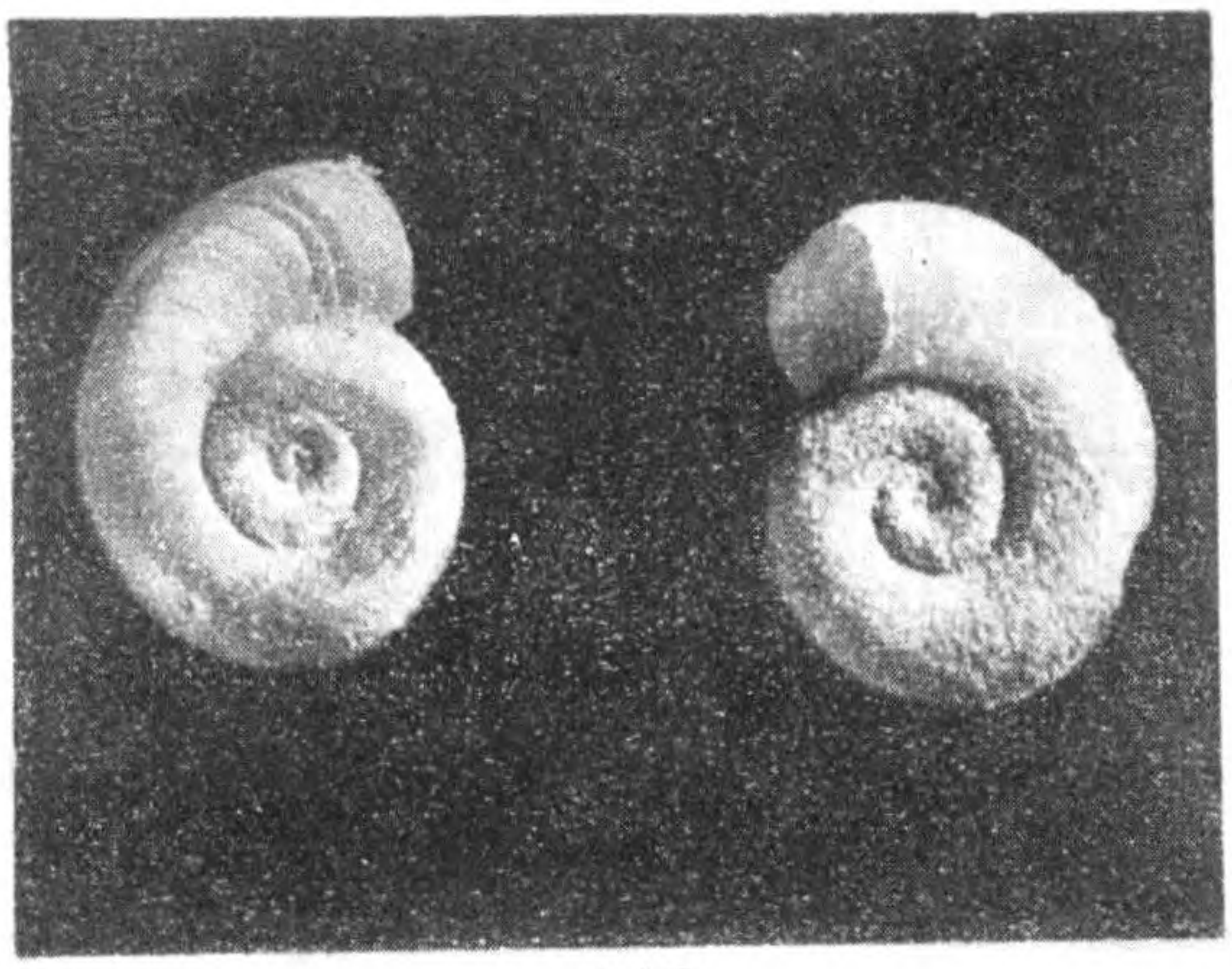

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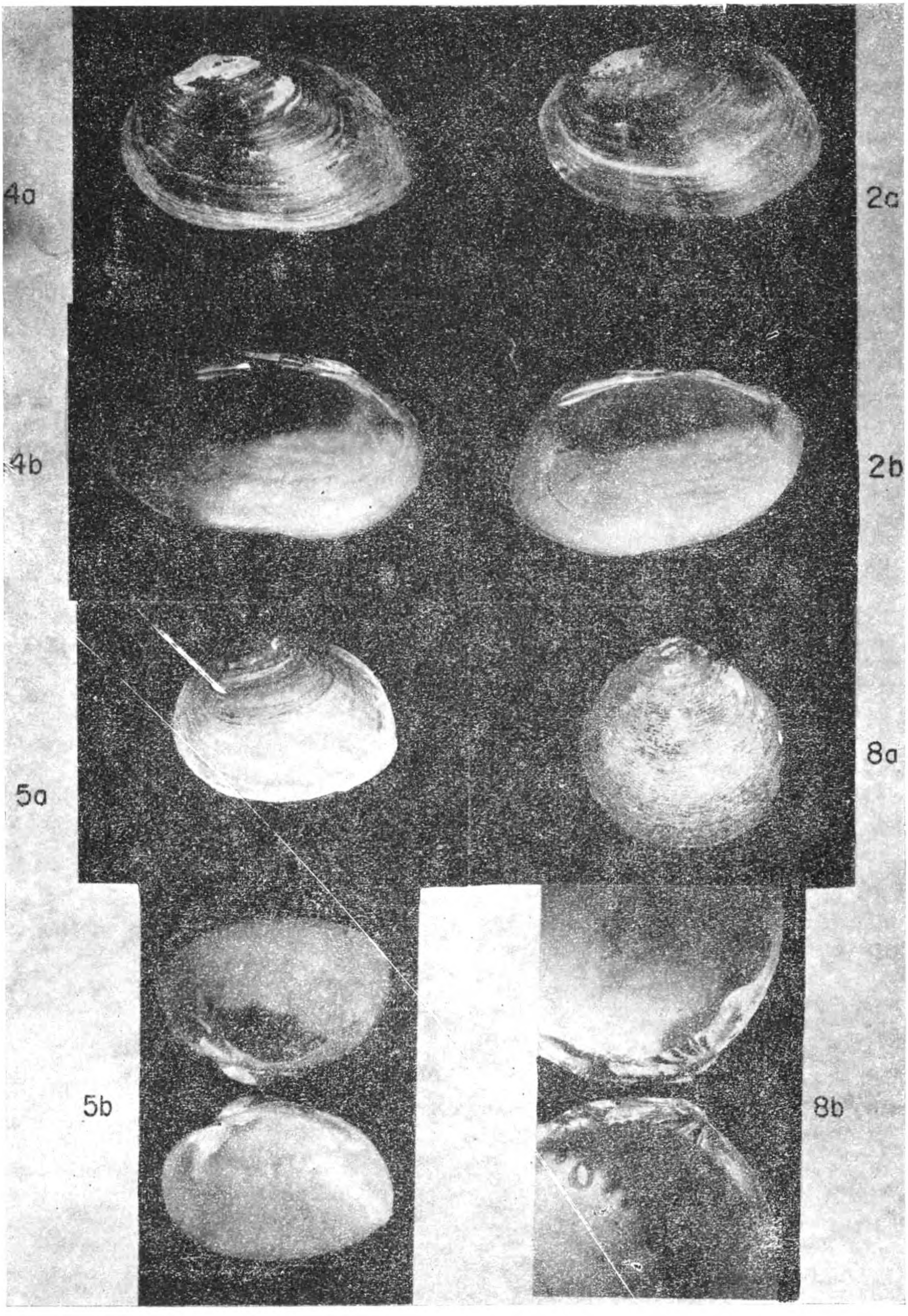
PLATE XVII

HADL—FRESHWATER MUSSELS—pp. 183–188



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