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LOLIGO SURINAMENSIS, A NEW SPECIES OF LOLIGINID SQUID (CEPHALOPODA, MYOPSIDA) FROM NORTHEASTERN SOUTH AMERICA [1]

by

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With 3 text-figures

While studying a collection of cephalopods from Surinam sent to me by Dr. C. O. van Regteren Altena, a number of loliginid squids were found that at first examination appeared to be *Loligo pealei* Lesueur, 1821. Further detailed study revealed a series of characters unknown in that species and sufficiently different from those of other known Western Atlantic loliginids to warrant the erection of a new species. An increased interest in the squids of this genus seems to warrant the publication of this new species in advance of the full report on the collections.

I wish to thank the officials of the Rijksmuseum van Natuurlijke Historie, Leiden, and particularly Dr. van Regteren Altena for the opportunity to study the collections. The illustrations are mine. This work was supported by a grant from the National Science Foundation GB2499X3 for which I extend my thanks.

Loligo surinamensis new species (figs. 1-3)

Material examined. — Holotype: Male, mantle length 118 mm, R/V "Coquette" Sta. 8-9, 30 miles northeast of the lightship "Suriname Rivier" in 110 feet (= 37 m), with trawl, 30 June 1966; W. Vervoort and C. Cornet leg.; RNHL alc. 9010. Paratypes: 7 males, mantle lengths 88-114 mm, 6 females, mantle lengths 75-118 mm, R/V "Coquette" Sta. 8-9, type locality; RNHL alc. 9011. — 2 males, mantle lengths 84-85 mm, R/V "Coquette", 5 miles northwest of lighter (mouth of the Surinam River), 106-102 feet, 19 February 1963; C. O. van Regteren Altena leg.; RNHL alc. 9012. — 1 male, mantle

1) Contribution No. 1662 from the University of Miami, Rosenstiel School of Marine and Atmospheric Science.

length 105 mm, R/V "Calamar" Sta. 121, 6°15'N, 54°45'W northeast of the mouth of the Surinam River in 27 m, 11 August 1967; UMML 31:1110.

Description. — As known from the material seen, this is a moderate size squid apparently not attaining the large size of its colder water relatives. The mantle length ranged from 75 to 118 mm.

The mantle (fig. 1a) is compact, tubular, tapering gradually from the anterior margin to a blunt posterior point. The anterior margin is wide (MWI — males, 18.6-*23.2*-26.1; females, 22.9-*25.4*-28.0) and slightly flaring. There is a distinct clearly defined dorsal lappet marking the anterior end of the gladius. Ventrally the margin is excavated beneath the funnel with broad but pointed angles marking the location of the mantle-funnel locking apparatus.

The fins are broadly rhombic in outline with rounded lateral angles. The anterior margins are convex; the posterior margins slightly concave. The fins are widest at about their mid-point. They occupy approximately 50% of the mantle length regardless of size (FLI — males, 50.0-*52.1*-56.8; females, 48.0-*52.5*-58.0; FWI — males, 44.9-*46.7*-50.0; females 47.1-*52.3*-58.0).

The head is squarish in cross-section (HWI — males, 19.5-*23.2*-25.0; females, 20.6-*23.7*-26.0). The eyes are large but little protruding with a distinct pore near the anterior edge of the orbit. The postero-ventral area is distinctly excavated for the funnel and in specimens in good condition the margins are sharply defined. There are two distinct nuchal folds on each side of the head — a small lappet next to the funnel and a crescentric lateral fold which bears the olfactory papilla anterior to its ventral angle.

The funnel is large and compact and extends anteriorly to about the middle of the pupil of the eye. The funnel member of the locking apparatus is narrow and sinuous, turned slightly dorsally posteriorly. The mantle member is narrow, of the same shape and about equal in length. Internally the funnel valve is large and conspicuous; the dorsal member of the funnel organ is Λ-shaped with large oval ventral pads.

The arms are of moderate length (ALI — males, 44.0-*45.5*-49.0; females, 40.6-*45.6*-48.0) and in the order 3.2.4.1 although some minor variation is found (3.2 = 4.1; 3 = 1.2.4; 3.4.2.1; 3.2 = 1.4). All of the arms bear dorsal and ventral protective membranes bordering the suckers; these are widest on the ventral margin of III and poorly developed on IV. The dorsal arms each bear a small but well developed dorsal keel originating on the dorsal margin at the arm base and extending nearly to the distal tip. Arms II have no keel but are sharply ridged on their dorsal and ventral margins. III bear the typical loliginid swimming keel on the aboral surface originating

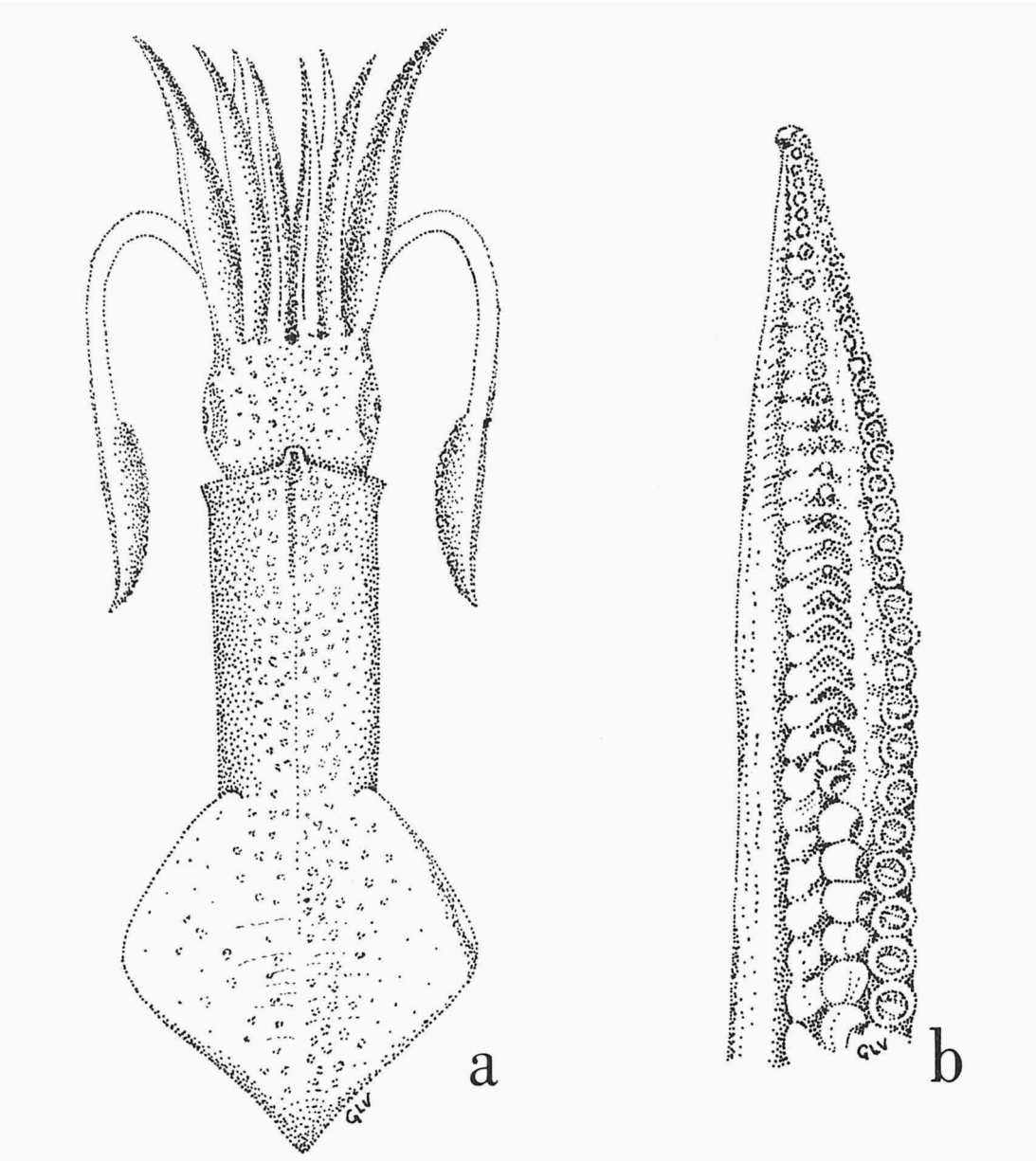

Fig. 1. *Loligo surinamensis* new species. a, dorsal view of female from "Coquette" Sta. 9, 118 mm mantle length; b, hectocotylized fourth left arm of male from "Coquette" Sta 9, 103 mm mantle length.

at the base and extending to the tip of the arm. It is deepest at about the midpoint of the arm. IV has no keel; there is a wide tentacular sheath on the dorsal margin and a sharply demarcated fold on the ventral margin, keel-like in structure.

The buccal membrane is 7-lobed, the supports attached dorsally on I and II, ventrally on III and IV. All lobes bear about 8 or 9 ringed suckers in two rows except the ventral pair of lobes which bear about 3 to 5 suckers each. The females bear a spermatophore pad or receptaculum ventrally on the buccal membrane. It is either circular or U-shaped with a raised ventral pad. The 111 mm-mantle-length female has the pad covered with a close-packed cluster of sperm reservoirs cemented to it. This specimen also is gravid with enlarged ovary with mature(?) eggs and an enlarged and swollen nidamental gland.

The arm suckers vary in size and dentition between the sexes. Particularly conspicuous is the enlargement of the suckers on I, II, and III in the males, the most easily seen specific difference.

In the males the suckers on I, II, and III have a narrow chitinous ring around the margin of the aperture (fig. 2c). On the distal half this ring bears 5 to 7, occasionally 8 broad flat teeth. The central two are narrower but square tipped. These are bordered by one or more broad plate-like teeth with small supplementary broad teeth sometimes present on the proximal side. The proximal half of the aperture is partially closed by a broad smooth non-incised plate. In the females arms I, II, and III are similar but much smaller in total size and the distal teeth are shorter and less conspicuous (fig. 2e).

On the right ventral arms of the males the basal 6 or 7 pairs of suckers are somewhat similar to those described above but their diameter is much reduced. From about the 8th pair distally for about 17-18 pairs the teeth become sharp pointed and fewer in number (fig. 2d); distad the teeth are again square-tipped or blunt. The left or hectocotylized arm has only square-tipped or blunt teeth on the unmodified suckers.

In the females all of the suckers on IV have blunt or square-tipped teeth.

The left ventral arm of the male is hectocotylized in the following fashion (fig. 1b). Proximally about 22 to 24 pairs of suckers are normal and gradually decrease in size. In the dorsal row at about the 22nd pair the sucker bases begin to enlarge and become transversely flattened and the suckers to decrease in size. At about the 25th sucker, the base forms a broad, flat triangular flap or papilla surmounted by a minute fleshy sucker. There are about 6 to 8 of these after which the pad gradually returns to normal and the suckers regain their normal size. In the ventral row about four or

five of the suckers are slightly reduced in size opposite the area of the greatest modification in the dorsal row. In the table of measurements, the length of the hectocotylus was taken from the base of the last unmodified sucker in the dorsal row to the tip of the arm.

The tentacular stalks are long and compressed. There is a dorsal keel originating at about the midpoint of the stalk. This extends to the base of the club where it expands and continues as a broad swimming membrane to the tip of the club. Orally, there is a median groove that extends to the club where the margins diverge to form the two protective membranes.

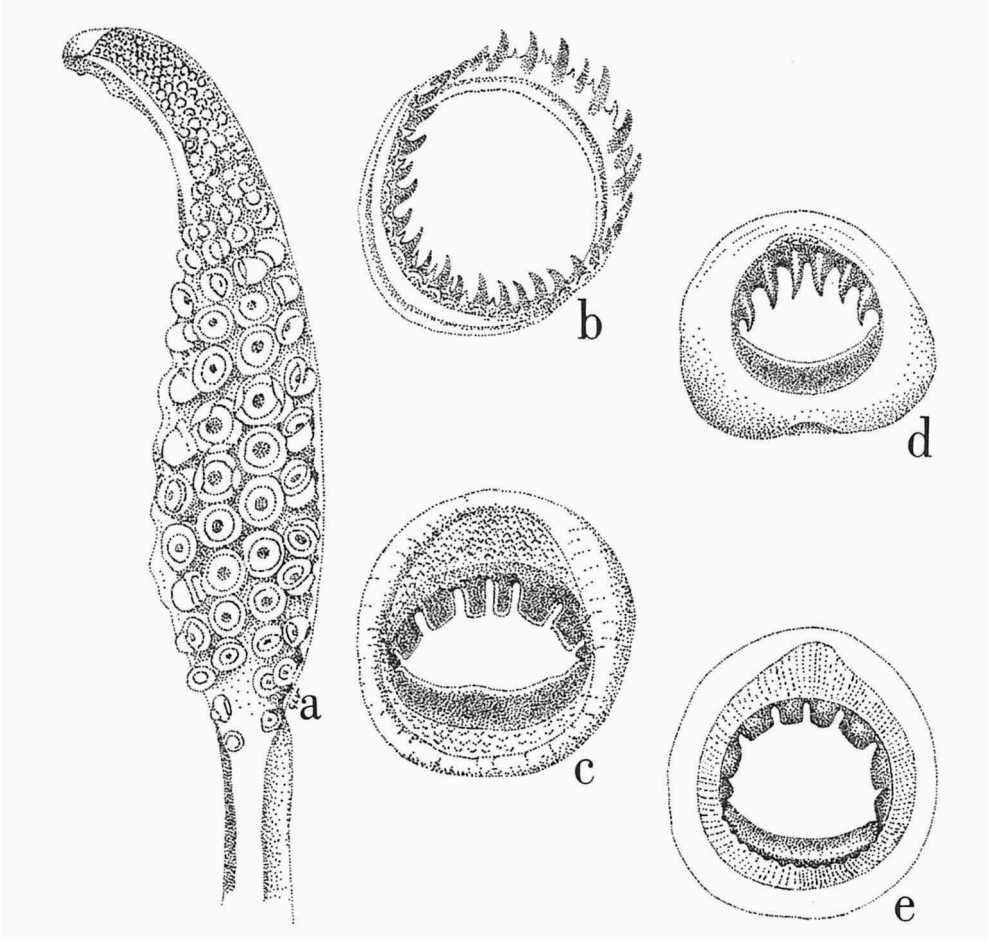

Fig. 2. *Loligo surinamensis* new species. a, left tentacular club from male, 103 mm mantle length; b, large tentacular club sucker of same; c, sucker from fourth pair from third arm of same; d, sucker from tenth pair from right ventral arm of same; e, sucker of fourth pair from third arm of female, 118 mm mantle length.

The tentacular club (fig. 2a) occupies about 30% of the tentacle length. It is expanded and has a distinct manus and dactylus but no distinguishable carpus. The club is bordered on either side by a well developed protective membrane with supports. There are between about 38 to 40 transverse rows of suckers on the club arranged in four longitudinal rows. The suckers of

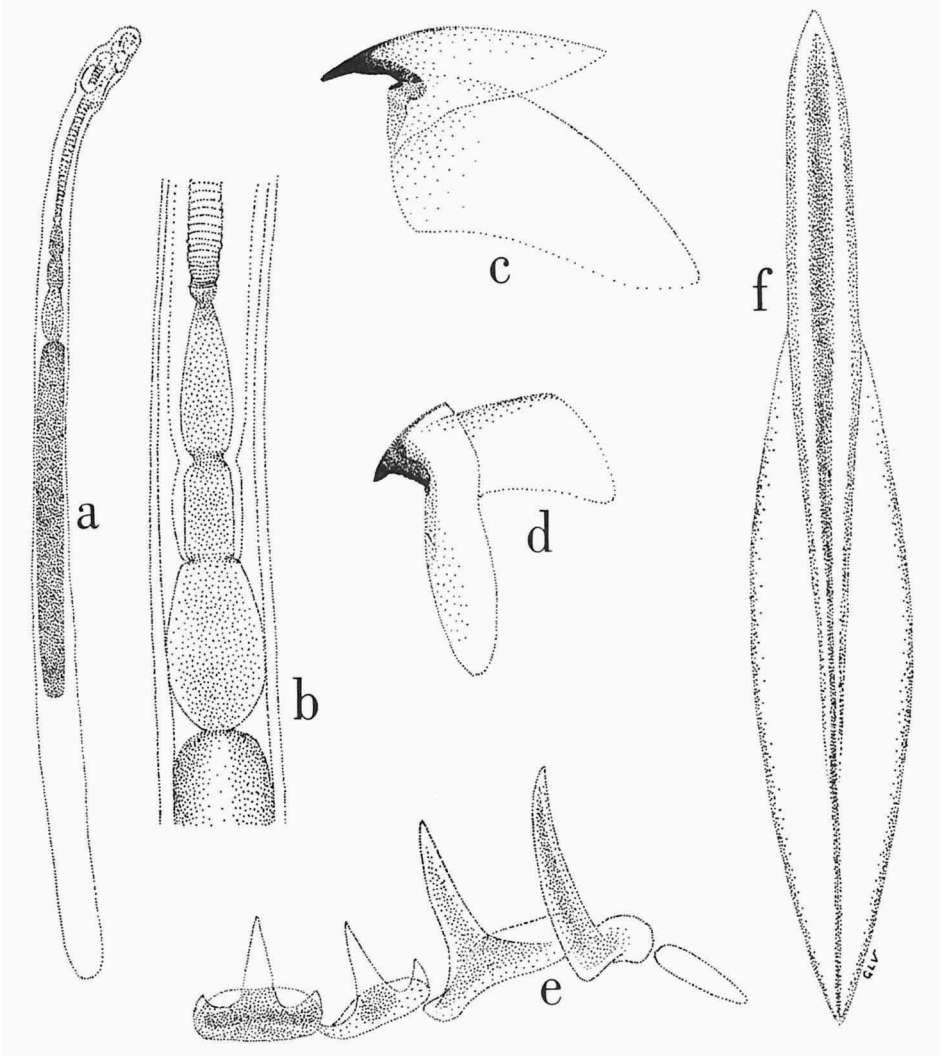

Fig. 3. *Loligo surinamensis* new species. a, spermatophore, 6 mm total length, from male, "Calamar" Sta. 121, 105 mm mantle length; b, details of mid-portion of same; c, d, mandibles from male, 103 mm mantle length; e, radula from same; f, gladius, total length 117 mm, from female, 118 mm length.

TABLE 1

Measurements (in mm) of 6 females of *Loligo surinamensis* new species

Mantle length	75	86	89	94	111	118
Mantle width	20	23	25	22	27	27
Head width	19	21	23	21	23	28
Fin length	36	46	43	48	64	66
Fin width	37	50	42	52	55	65
Arm length I	27	32	33	31	42	36
II	33	38	37	37	45	43
III	37	42	41	43	48	48
IV	30	38	36	36	44	45
Tentacle length	77	66	107	71	111	75
Club length	27	31	29	31	38	36
Sucker Diam. III	1.0	1.1	1.2	1.5	1.5	1.5
Tent. sucker diam. L	1.5	1.8	1.8	1.5	2.0	2.0
Tent. sucker diam. S	1.0	1.2	1.2	1.0	1.5	1.5
Gladius length	—	—	91	—	117	117
Vane length	—	—	64	—	84	84
Gladius width	—	—	17	—	25	21
Rachis width	—	—	7	—	8	8

TABLE 2

Indices of bodily proportions of 6 females of *Loligo surinamensis* new species

Mantle length	75	86	89	94	111	118
MWI	26.6	27.0	28.0	23.4	24.2	24.2
HWI	25.3	24.5	26.0	22.3	20.6	23.7
FLI	48.0	53.5	48.3	51.0	58.0	56.0
FWI	49.5	58.0	47.1	55.0	49.1	55.0
ALI I	36.0	37.2	37.0	33.0	38.0	30.5
II	44.0	44.0	41.5	39.4	40.5	36.4
III	49.4	49.0	46.0	45.7	43.0	40.6
IV	42.0	44.0	40.5	38.3	39.5	38.0
TLI	103.0	77.0	120.0	75.5	100.0	63.5
CLI	36.0	36.0	32.6	33.0	34.2	30.5
ASI III	1.3	1.3	1.3	1.6	1.3	1.3
TSI_l	2.0	2.1	2.0	1.6	1.8	1.7
TSI_s	1.3	1.4	1.3	1.1	1.3	1.3
GWI	—	—	18.7	—	21.5	18.0
VLI	—	—	70.0	—	71.5	71.5
RWI	—	—	7.7	—	6.8	6.8

TABLE 3

Measurements (in mm) of 9 males of *Loligo surinamensis* new species

Mantle length	84	85	88	88	94	103	107	114	118
Mantle width	21	20	21	23	23	24	23	26	22
Head width	20	20	22	23	21	23	26	25	23
Fin length	44	43	44	45	47	53	58	60	67
Fin width	38	39	44	40	46	48	48	55	53
Arm length I	37	37	34	33	43	37	42	50	49
II	38	37	37	42	40	42	47	47	49
III	37	39	41	43	43	46	48	50	53
IV	36	36	37	40	36	42	43	45	46
Hect. arm length	35	36	36	34	37	38	41	42	46
Hect. length	11	11	11	11	13	12	13	12	14
Tentacle length	63	75	70	87	71	82	59	85	80
Club length	22	24	26	27	31	32	29	30	32
Sucker Diam. III	1.5	1.5	1.4	1.5	1.5	1.6	1.6	1.8	1.8
Tent. sucker diam. L	1.5	1.5	1.5	1.8	1.5	1.8	1.6	1.8	1.9
Tent. sucker diam. S	1.0	1.0	1.0	1.0	1.0	1.1	1.0	1.2	1.5
Gladius length	—	—	—	91	—	105	—	119	—
Vane length	—	—	—	63	—	72	—	84	—
Gladius width	—	—	—	15.5	—	17.0	—	20	—
Rachis width	—	—	—	6.0	—	7.0	—	7.5	—

TABLE 4

Indices of bodily proportions of 9 males of *Loligo surinamensis* new species

Mantle length	84	85	88	88	94	103	107	114	118
MWI	25.0	23.5	23.8	26.1	24.5	23.3	21.5	22.8	18.6
HWI	23.8	23.5	25.0	26.1	22.3	22.3	24.3	22.0	19.5
FLI	52.3	50.5	50.0	51.1	50.0	51.5	54.0	52.8	56.8
FWI	45.1	46.0	50.0	45.5	49.0	46.6	44.9	48.0	45.0
ALI I	44.0	43.5	38.6	37.5	45.7	35.9	39.3	44.0	41.5
II	45.1	43.5	42.0	47.8	42.6	41.8	44.0	41.2	41.5
III	44.0	45.8	46.6	49.0	45.7	44.6	44.8	44.0	45.0
IV	42.9	42.3	42.0	45.5	38.3	41.8	40.0	39.5	39.0
HcLI	31.4	30.5	32.3	32.3	35.0	31.6	31.7	28.5	30.4
TLI	75.0	88.0	79.6	99.0	—	79.5	55.0	74.5	68.0
CLI	26.2	28.2	29.5	30.8	—	31.1	27.0	36.3	27.1
ASI III	1.8	1.8	1.6	1.7	1.6	1.6	1.5	1.6	1.5
TSI_1	1.8	1.8	1.7	2.5	—	1.8	1.5	1.6	1.6
TSI_8	1.2	1.2	1.1	1.1	—	1.1	.9	1.1	1.3
GWI	—	—	—	17.0	—	16.2	—	16.8	—
VLI	—	—	—	84.5	—	67.6	—	70.5	—
RWI	—	—	—	6.6	—	6.7	—	6.3	—

TABLE 5

Ranges and means of indices of bodily proportions of 6 females and 9 males of *Loligo surinamensis* new species

Index	Females N = 6	Males N = 9
Mantle length	75.0-*95.5*-118	84.0-*97.9*-118
MWI	22.9-*25.4*-28.0	18.6-*23.2*-26.1
HWI	20.6-*23.7*-26.0	19.5-*23.2*-25.0
FLI	48.0-*52.5*-58.0	50.0-*52.1*-56.8
FWI	47.1-*52.3*-58.0	44.9-*46.7*-50.0
ALI I	30.5-*35.3*-38.0	35.9-*41.1*-44.0
II	36.4-*41.0*-44.0	41.2-*43.3*-47.8
III	40.6-*45.6*-49.0	44.0-*45.5*-49.0
IV	38.0-*40.1*-44.0	38.3-*41.3*-45.5
HcLI	————	30.4-*31.5*-28.5
TLI	63.5-*89.8*-120.0	68.0-*77.3*-99.0
CLI	30.5-*33.7*-36.0	26.2-*29.5*-36.3
ASI III	1.3- *1.4*- 1.6	1.5- *1.6*- 1.8
TSI_1	1.6- *1.7*- 2.1	1.5- *1.8*- 2.5
TSI_8	1.1- *1.3*- 1.4	1.1- *1.1*- 1.2
GWI N = 3	18.0-*19.4*-21.5	16.2-*16.7*-17.0
VLI N = 3	70.0-*71.0*-71.5	67.6-*74.2*-84.5
RWI N = 3	6.8- *7.1*- 7.7	6.3- *6.5*- 6.7

the manus are enlarged, the suckers of the median two rows being about 1/3 larger than the marginal suckers. The largest median suckers have horny rings bearing irregularly alternating large and small teeth averaging about 48-49 teeth per ring (fig. 2b). The marginal suckers average about 22 to 24 teeth per ring, the teeth larger and sharper on the outer margin.

The beaks or mandibles were dissected out and are shown in fig. 3c, d.

The radula was extracted, mounted in CMC10 and was illustrated (fig. 3e). The rachidian and first lateral teeth are nearly of equal size. The latter bears a prominent ectocone on the outer side while the inner side of the base is elongate. The second lateral is tall, somewhat slender, with an elongate base. The third lateral is sabre-like. The marginal plates are narrow and elongate with a somewhat squarish inner end.

The gladius has a stout rachis and strong mid-rib. The vane is wide with curved margins which are only slightly thickened (fig. 3f). Due to shrinkage, the total length of most gladii exceeded the mantle length of the specimens dissected.

The spermatophores are small and slender (fig. 3a). The sperm mass occupies only a small percentage of the length of the spermatophores. The mid-section is as illustrated (fig. 3b).

The color in preserved specimens is yellowish brown with numerous small

to large brown and reddish brown chromatophores both dorsally and ventrally but most numerous on the dorsum of the head and mantle.

Holotype. — A male, mantle length 118 mm, RNHL alc. 9010.

Type locality. — Thirty miles northeast of the lightship "Suriname Rivier" in 110 feet off the coast of Surinam.

Discussion. — This species is closely related to *Loligo pealei* of the eastern United States but it differs from it in many ways. Perhaps the most important differences are found in the males. In *L. surinamensis* the modified portion of the hectocotylized arm consists of flattened pedicels forming distinct lappets; in *L. pealei* the pedicels are round or only slightly flattened. In *L. surinamensis* the suckers of the midportion of the right ventral arm bear sharply pointed teeth in contrast with square-tipped teeth in *L. pealei*. Another striking feature is the enlarged suckers of arms II and III in the males. These suckers are approximately the same size as the median suckers of the tentacular club. These suckers are not enlarged in *L. pealei*.

Similarly, differences are found in other parts. The first laterals of the radular teeth are large while the marginal plates are long and slender differing strikingly from the short wide plates of *L. pealei*. The spermatophores also show differences in the construction of the cement body and the comparative length of the sperm mass.

The dentition pattern of the median suckers of the manus of *L. pealei* is rather characteristic although great variation occurs. *L. surinamensis* presents no definite dentition pattern but approaches in areas of the ring some of the variant patterns known for *L. pealei*.

L. surinamensis does not approach in similarity any of the other known species of loliginids in the Western Atlantic.

A final problem remains — the identity of *Loligo brasiliensis* Blainville, 1823. Blainville's description was exceedingly short and general; it is impossible on the basis of the original description to recognize this species. Most subsequent workers have relied upon d'Orbigny's (1835) figures and description but neither of these was based upon the original material and it appears that at least three different species were included by d'Orbigny. The figure of the whole animal is *Loligo*-like; the figure of the pen is that of a *Doryteuthis*-like animal, while the coloration fits none of these but corresponds to that of another as yet undescribed species. A search of the Paris Museum made during two different visits has failed to uncover Blainville's specimen.

The name *L. brasiliensis* was re-introduced into the literature by Castellanos (1967) for a species of *Loligo* from Argentine waters. Her reasons for resurrecting Blainville's species are unclear; presumably it was because

her animals came from near Brazil. However, as stated previously, it is impossible to identify the species from Blainville's description. The animals described by Castellanos do not correspond to *L. surinamensis*. Whether Castellanos' species is indeed *L. brasiliensis* must await detailed study of the cephalopods of Brazilian waters.

Geographical distribution. — Too few records of this new species are available to present more than a very fragmentary description of its distribution. Specimens are now known only from the Guianas. No specimens are known from the Antilles or the Caribbean Coast of South America.

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