STUDIES ON THE FAUNA OF CURAÇAO AND OTHER CARIBBEAN ISLANDS: No. 151.

TAXONOMIC CONSIDERATIONS ON BRANCHIOSTOMA CARIBAEUM FROM JAMAICA

by

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Branchiostoma caribaeum was first described by SUNDEVALL (1853). It was the third species of *Branchiostoma* to be described. With the exception of the myotome formula (myotomes anterior to atriopore + between atriopore and anus + posterior to anus = recorded totals), which was made by ANDREWS (1893), the characteristics of the species were determined from two small specimens from Puerto Rico.

SYNONYMS

Synonyms for *Branchiostoma caribaeum* are:

Branchiostoma lubricum: GOODE & BEAN, 1879 (East Florida, name only).

Amphioxus lanceolatus: RICE, 1880 (habits, structure and development).

Branchiostoma lanceolatum: JORDAN & GILBERT, 1882 (specimens from east coast of North America); GUNTHER, 1884 (specimens from Caribbean Sea); ADAMS & KENDALL, 1891 (specimens from southwest Florida); ANDREWS, 1893 (myotome formula of specimens from Chesapeake Bay).

Branchiostoma lanceolata: GILL, 1883 (Atlantic Coast of U.S.).

Amphioxus (no specific name): WRIGHT, 1890 (Port Tampa, Florida); ANDREWS, 1892 (young stages from Jamaica); WELLS, 1926 (ecology, habits, breeding season, age at sexual maturity and collecting methods, Florida).

Amphioxus caribaeus: KIRKALDY, 1895 (in part description and distribution, but *B. platae* also included).

Branchiostoma caribbaeum: TATTERSALL, 1903 (compared with *B. lanceolatum* and *B. belcheri*).

Branchiostoma floridae: HUBBS, 1922 (description of Tampa and other Florida locations); PRATT, 1935 (number of myotomes, gonads, Florida).

Branchiostoma virginiae: HUBBS, 1922 (description of specimens from Chesapeake Bay); PRATT, 1935 (number of myotomes of specimens from Chesapeake Bay to Florida).

TYPE SERIES

The distinguishing features of *Branchiostoma caribaeum* as described by SUNDEVALL (1853) (Fig. 10) are: dorsal fin ray chambers 227–231; preanal (ventral) fin ray chambers 33–35. The highest dorsal fin ray chambers are about three times as high as long; dorsal fin about one eighth as high as body. Anus located near the middle of the lower caudal lobe about equal to the distance from there to the tail. Preatrioporal length about 2.5 times the postatrioporal length. Maximum length 50 mm. Most of the myotome counts were made by ANDREWS (1893) who worked out the myotome formula to be: 27 to 37 (myotomes anterior to atriopore) + 12 to 14 (myotomes between atriopore and anus) + 9 (myotomes posterior to anus) = 48 to 61 (recorded total).

BIGELOW & FARFANTE (1948) added to the description of *Branchiostoma caribaeum* as follows – "The anterior end of the notochord in the rostrum extends forwards in a straight line; rostrum marked off from dorsal fin by a subtriangular notch; caudal fin symmetrically lanceolate with narrowly rounded tip, its lower lobe considerably higher than ventral or dorsal fins, its origin opposite the origin of the upper lobe and about midway between tip of the caudal fin and the atriopore. The distance between the tip of the caudal fin and the anus is about one third the distance from anus to atriopore; gonads on one side 22–29; colour of live animals semi-transparent, those kept in alcohol become opaque and whitish".

COLLECTING AREA AND METHODS OF STUDY

Kingston Harbour is situated on the south coast of Jamaica at latitude 17°57′ N. and longitude 76°48′ W. It covers an area of 20 square miles and is partially enclosed by a sandspit – The Palisadoes. It is 9 miles long from east to west and 2 miles wide from north to south at its greatest width. Tidal variations are small, mean range is 0.77 feet and the extreme range is 2.90 feet. Most of the freshwater run off enters the harbour at Hunts Bay from the Rio Cobre, Sandy Gully drainage system and the Ferry River (Fig. 9). Salinity readings in Kingston Harbour do not vary appreciably (33–36‰) throughout the year; except near the mouths of freshwater outlets into the harbour.

Branchiostoma caribaeum is found in Kingston Harbour wherever sand sediments

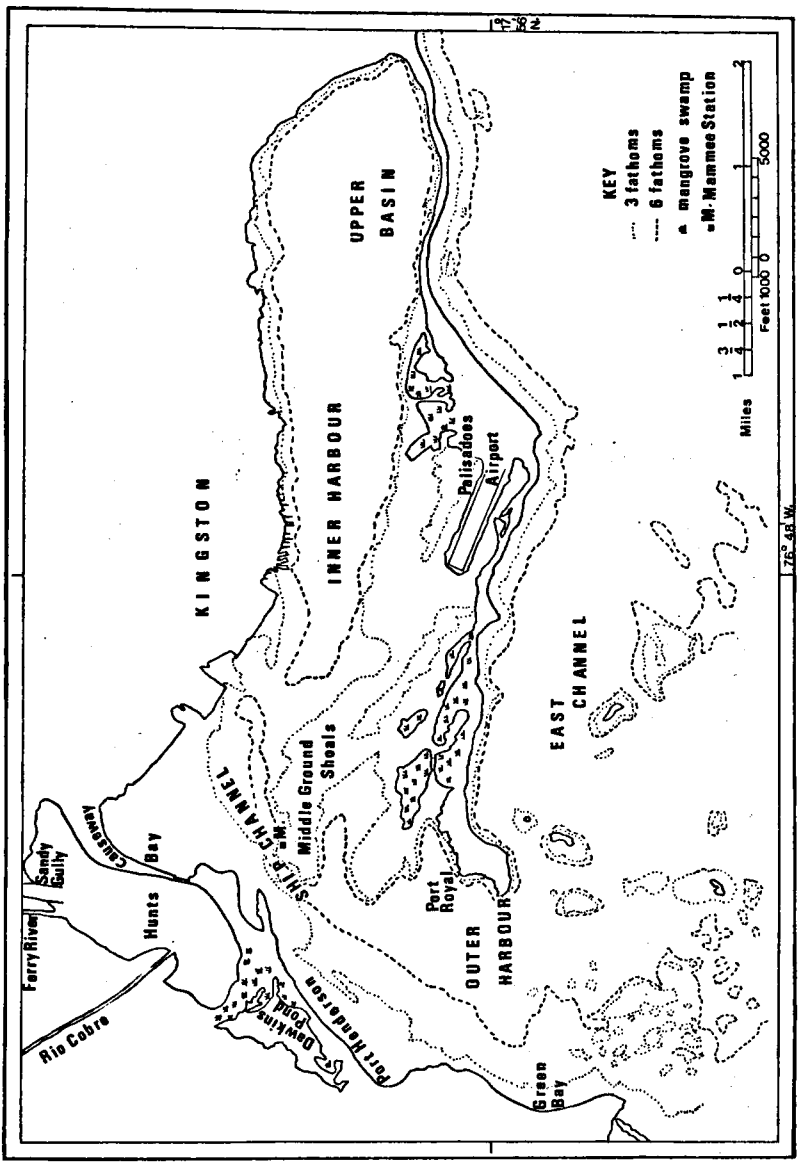

Fig. 9. Sketch map of KINGSTON HARBOUR, Jamaica. [Government of Jamaica – *Kingston Harbour Study*, 1968]

predominate, that is within the 3 fathom contour (Fig. 9). The sands of Kingston Harbour are volcanic and/or carbonate in composition. Using the Wenworth sediment size classification (BARNES, 1959), the sand sediments were divided into five grades: fine, medium, coarse, very coarse sand and granules. The coarse and very coarse sands form 66 percent of the sands sampled. The organic content of the sands was low.

Specimens of *Branchiostoma caribaeum* for the statistical analysis, were obtained from a single station in Kingston Harbour – On the Middle Ground Shoals. At the station the depth of the water was 3 feet at high tide. The sediment was composed of very coarse sand with a median diameter 1.29 mm; percentage carbon 0.99; and percentage of organic matter 1.70.

The lowest density of *B. caribaeum* recorded at this station was 360/m² and the highest was 5,040/m². The largest specimen found in Kingston Harbour was 45 mm. long. (To be discussed in a subsequent paper).

The animals were collected by using a 0.025 m² van Veen grab. For the statistical analysis, counts and measurements were made on 100 specimens of an approximate length of 25 mm. The specimens were preserved in 4% formalin. The taxonomic characters were observed with a low power binocular microscope.

TAXONOMIC CHARACTERS OF *Branchiostoma caribaeum* FROM JAMAICA

A statistical analysis was carried out on twelve taxonomic characters.

The number of preanal (ventral) fin ray chambers varied from 20 to 42, with 61 percent of the specimens possessing 28 to 35 chambers (see Fig. 17). BIGELOW & FARFANTE (1948) recorded counts of 15 to 37 for specimens from Puerto Rico and 33 to 42 for specimens from Virginia and North Carolina. BOSCHUNG & GUNTER (1962) 35 to 61 for specimens from Mississippi Sound.

The number of dorsal fin ray chambers varied from 207 to 312, with 58 percent of the specimens possessing 220 to 250 chambers (Fig. 16). BIGELOW & FARFANTE (1948) gave a minimum count of 227 dorsal fin ray chambers for specimens from Puerto Rico and a maximum count of 330 for specimens from Florida. BOSCHUNG & GUNTER (1962) working with specimens from the Mississippi Sound counted a range of 252 to 359 chambers, with 84 percent of the specimens possessing 281 to 330 dorsal fin ray chambers. The range of numbers of dorsal fin ray chambers and ventral fin ray chambers are compared with the other species of the Western Atlantic (Fig. 13–14).

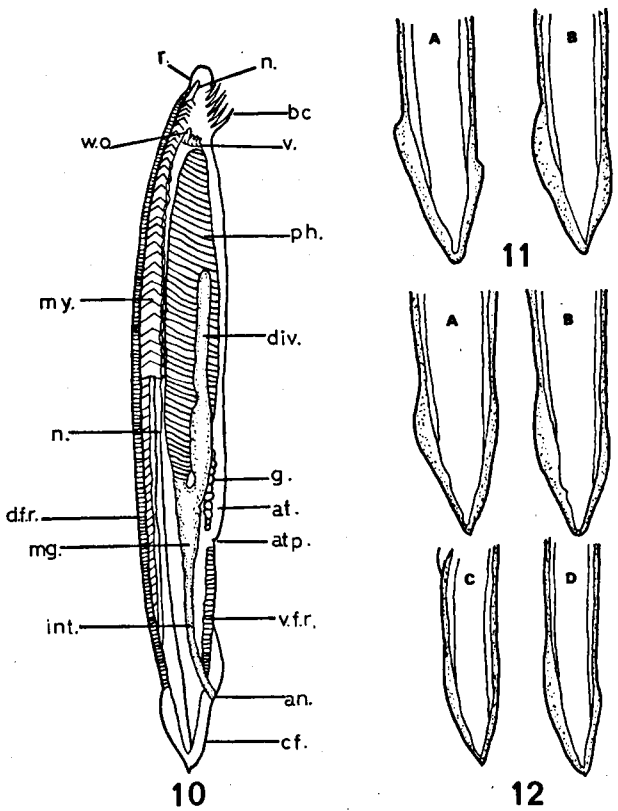

Fig. 10. *Branchiostoma caribaeum*. – The body wall and atrial wall (at.)have been removed on the right side, showing the pharynx (ph.), mid-gut (mg.) with its diverticulum (div.) and intestine (int.). The oral hood has been cut away on the right, leaving the buccal cirri (b.c.), wheel organ (w.o.), and velum (v.). – an.-anus; atp.–atriopore; c.f.–caudal fin; d.f.r.–dorsal fin ray chambers; g.–gonads; my.–myotomes; n.–notochord; r.–rostrum; v.f.r.–ventral fin ray chambers.

Fig. 11. – Variations of caudal fin shapes of specimens of *Branchiostoma caribaeum* from Kingston Harbour, Jamaica.

Fig. 12. – Variation of caudal fin shapes of four specimens of *B. caribaeum* from Mississippi Sound [Boschung & Gunter 1962, fig. 12].

[Upper caudal lobe (dorsal) facing the left side of the page in Fig. 10, facing the right side in Fig. 11–12.]

All the specimens of *Branchiostoma caribaeum* found in Kingston Harbour have the lower lobe of the caudal fin originated anterior to the upper lobe as in caudal fin B (Fig. 11). The larger specimens

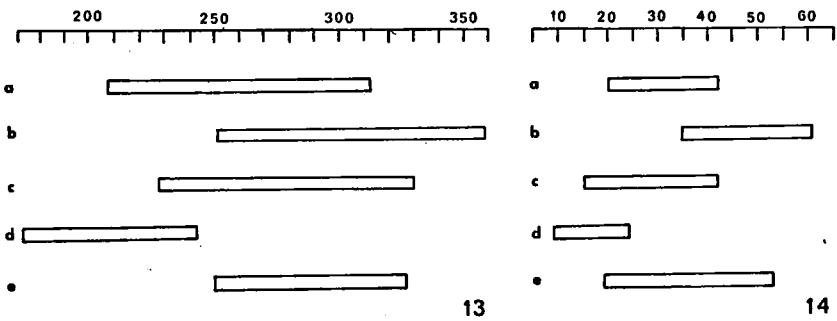

Fig. 13–14. The range of numbers of fin ray chambers of the Jamaica specimens of *Branchiostoma caribaeum* compared with the other species of the Western Atlantic. – a = *B. caribaeum*, Jamaica. b = *B. caribaeum*, Mississippi Sound. c = *B. caribaeum*, type series. d = *B. bermudae*. e = *B. platae*. – 13: the dorsal fin ray chambers; 14: the ventral fin ray chambers.

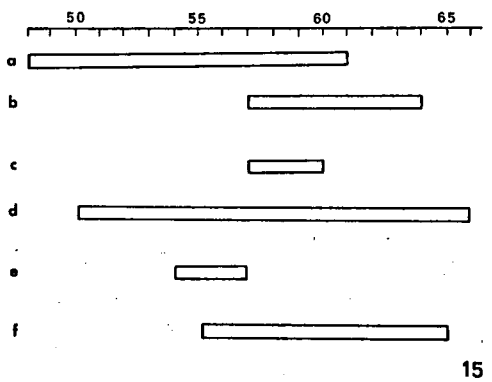

Fig. 15. The range of the total myotome numbers for specimens of *Branchiostoma caribaeum* from different localities compared with the other species of the Western Atlantic. – a = *B. caribaeum*, type series, ANDREWS 1893. b = *B. caribaeum*, previously recorded, including *B. floridae* and *B. virginiae*. c = *B. caribaeum*, Mississippi Sound. d = *B. caribaeum*, Jamaica. e = *B. bermudae*. f = *B. platae*.

show a variation in shape of the lower lobe of the caudal fin (Fig. 11), the lower lobe of specimen B gradually widens from its point of origin, while the lower lobe of specimen A has its greatest width almost at right angles from the point of origin.

The caudal fin length of the Kingston Harbour specimens varied from 7 to 20 percent of the total body length (Fig. 18).

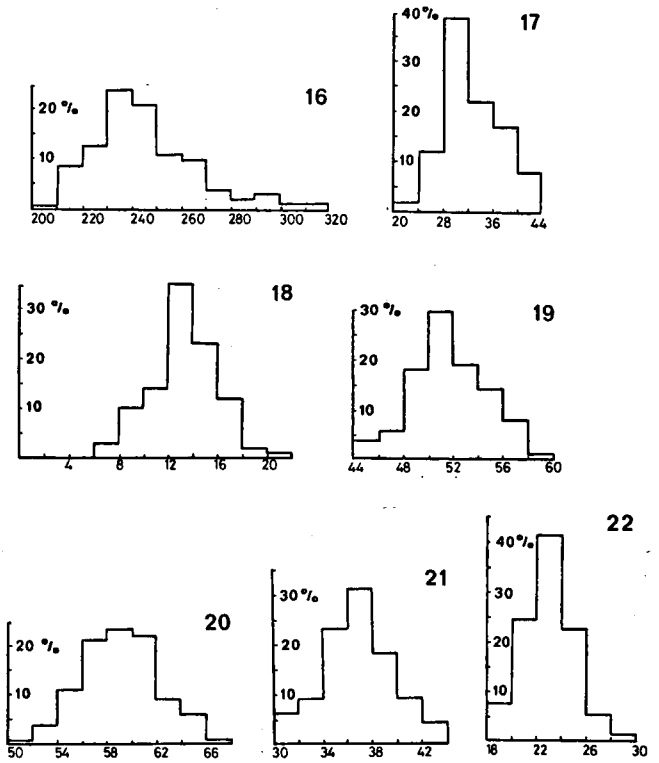

Fig. 16–22. Statistical analysis of specimens of *Branchiostoma caribaeum* from Kingston, Harbour, Jamaica. – 16: Percentage frequency of number of dorsal fin ray chambers. – 17: Perc. freq. of number of ventral fin ray chambers. – 18: Perc. freq. of caudal fin length expressed as a percentage of the total body length. – 19. Perc. freq. of position of anus by myotome number. – 20. Perc. freq. of total numbers of myotomes. – 21. Perc. freq. of number of preatriopore myotomes. – 22. Perc. freq. of number of postatriopore myotomes.

The position of the anus by myotome number varies from 44 to 58 with 67 percent of the specimens possessing the anal opening at myotome numbers 48 to 53 (Figure 19). Of the 100 animals examined 62 percent had the anus behind the midpoint of the lower lobe of the caudal fin and 38 percent had the anus at the midpoint of the lower lobe of the caudal fin.

The number of preatriopore myotomes varied from 30–43, with

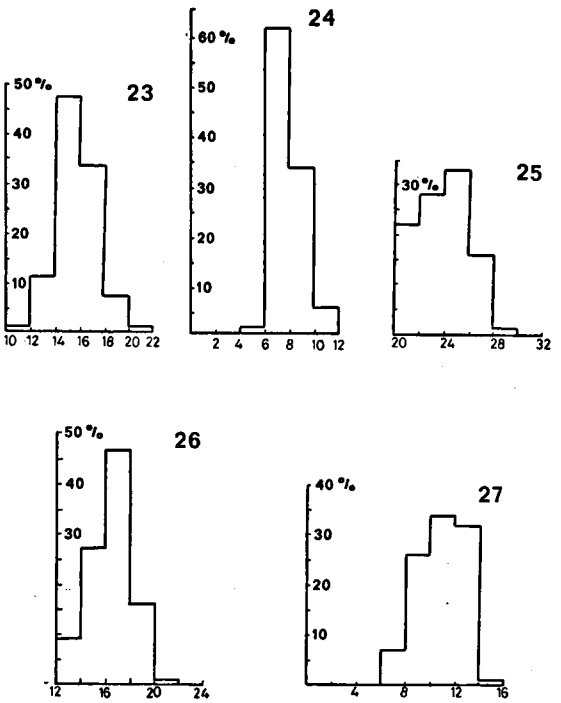

Fig. 23–27. Statistical analysis of specimens of *Branchiostoma caribaeum* from Kingston Harbour, Jamaica. – 23: Percentage frequency of number of myotomes between atriopore and anus. – 24. Perc. freq. of number of postanal myotomes. – 25: Perc. freq. of number of gonads on the right side only. – 26: Perc. freq. of number of buccal cirri on the right side only. – 27: Perc. freq. of the body depth expressed as a percentage of total body length.

54 percent of the specimens possessing 34–37 (Fig. 21). The post-atriopore myotome number varied from 18–29 with 87 percent having 20–25 (Fig. 22). The number of myotomes between atriopore and anus varied from 11–21 with 80 percent of the specimens having 14–17 (Fig. 23). The number of postanal myotomes was 5–10, with 61 percent of the specimens possessing 6–7 (Fig. 24). The total number of myotomes varied from 50–66, with 66 percent of the specimens possessing 56–61 (Fig. 20). The myotome formula would then be 30 to 43 (preatriopore myotomes) + 11 to 21 (myotomes between atriopore and anus) + 5 to 10 (postanal myotomes) = 46

to 74 (total myotomes). The minimum and maximum totals of myotomes actually recorded (50 to 66) were less than the theoretically possible limits (46 to 74).

The gonads were counted on the right side of each specimen. The gonads varied from 20 to 28, with 61 percent of the specimens having 22 to 25 gonads on the right side (Fig. 25).

Buccal cirri were counted on the right side only. They varied from 13 to 20, with 74 percent of the specimens having 14–17 buccal cirri on the right side (Fig. 26).

The body depth varied from 7 to 15 percent of the total body length with 92 percent having a depth of 8 to 13 percent of the total body length (Fig. 27).

Since this study was done on animals of approximately the same length, there was no data to support BOSCHUNG & GUNTER's (1962) findings that there was no correlation between numbers of gonads and size of animal. Also BOSCHUNG & GUNTER found that the number of buccal cirri and body depth were directly proportional to the length of the animal.

Table 6 summarises the statistical analysis of the specimens of *Branchiostoma caribaeum* from Kingston Harbour. The characters are ranked in order of increasing variation or decreasing taxonomic significance. The rank of the twelve taxonomic characters is compared with that obtained by BOSCHUNG & GUNTER (1962) for the specimens of *B. caribaeum* from Mississippi Sound. The least variable character is the number of preatriopore myotomes for both specimens. The position of the anus ranks as the third least variable character for both specimens. The variation of four other characters are similar. They are: myotomes between atriopore and anus; postanal myotomes; body depth as a percentage of total body length; and dorsal fin ray chambers. BOSCHUNG & GUNTER (1962) do not include buccal cirri and gonads in their statistical table. Therefore the number of preatriopore myotomes is the most important diagnostic character (because it is the least variable), but it cannot be used on its own to separate *B. caribaeum* from the other species of the Western Atlantic.

TABLE 6

STATISTICAL TABLE OF 12 TAXONOMIC CHARACTERS OF *Branchiostoma caribaeum*

from Kingston Harbour, Jamaica. The rank of the Jamaica specimens is compared with that of the specimens from Mississippi Sound (BOSCHUNG & GUNTER, 1962)

1 = Total myotomes
2 = Preatriopore myotomes
3 = Postatriopore myotomes
4 = Myotomes between atriopore and anus
5 = Postanal myotomes
6 = Caudal fin length as a percentage of total body length
7 = Body depth as a percentage of total body length
8 = Dorsal fin ray chambers
9 = Ventral (preanal) fin ray chambers
10 = Position of anus
11 = Gonads (on right side only)
12 = Buccal cirri (on right side only)

TAXONOMIC CHARACTERS	1	2	3	4	5	6	7	8	9	10	11	12
Range	50–66	30–43	18–29	11–21	5–10	7–20	7–15	207–312	20–42	44–58	20–28	13–20
Mean	58.5	36.2	22.4	15.1	7.2	13.0	10.4	242.4	32.2	51.2	23.4	16.2
Standard deviation	7.1	3.7	4.4	2.7	2.0	5.1	3.1	31.3	3.6	5.7	4.3	1.7
Standard error	0.71	0.37	0.44	0.27	0.20	0.50	0.31	3.13	0.36	0.57	0.43	0.17
Coefficient of variation	12.1	10.2	19.6	17.9	27.8	39.2	29.8	12.9	11.2	11.1	18.4	10.5
Rank	5	1	9	7	10	12	11	6	4	3	8	2
Rank of Mississippi Sound specimens	2	1	4	6	9	8	10	7	12	3	–	–

DISCUSSION

BIGELOW & FARFANTE (1948) stressed that the shape of the caudal fin was one of the distinguishing features which separated *Branchiostoma caribaeum* from *B. bermudae* and *B. platae*, but BOSCHUNG & GUNTER (1962) have shown that the caudal fin of *B. caribaeum* from Mississippi Sound varied in shape. In Figure 12 caudal fin B shows the upper lobe considerably posterior to the lower lobe. This shape, when compared with the figures of BIGELOW & FARFANTE (1948, figs. 2-A and F), was seen to be similar to that of *B. bermudae* and *B. platae*. All the specimens of *B. caribaeum* found in Kingston Harbour, also have the upper lobe of the caudal fin considerably posterior to the lower lobe (Fig. 11). Caudal fins D and A (Fig. 12) are most typical of the specimens of *B. caribaeum* from Mississippi Sound, A being the most characteristic of the larger specimens (and similar to the figure of *B. caribaeum* by BIGELOW & FARFANTE fig. 2-E). Therefore it is suggested that the shape of the caudal fin is not a distinguishing factor in determining whether the specimen is *B. caribaeum* or *B. bermudae*, or *B. platae*.

When the range of numbers of ventral fin ray chambers of the Jamaica specimens were compared with the other species of *Branchiostoma* of the Western Atlantic (see Fig. 14), the Jamaican specimens showed the smallest variation, with the exception of *B. bermudae*. In Figure 13, the range of dorsal fin ray chambers of the Jamaican specimens are compared with the other species of *Branchiostoma* of the Western Atlantic. The range of numbers of dorsal fin ray chambers of the Jamaican specimens overlaps but does not encompass that of the other species of the Western Atlantic. While the range of numbers of dorsal fin ray chambers for *B. platae* is completely encompassed by that of *B. caribaeum* (type series).

The previous known range of myotomes for *Branchiostoma caribaeum* was 57 to 64 based on the work of ANDREWS (1893), HUBBS (1922) and BIGELOW & FARFANTE (1948) (this includes *B. floridae* and *B. virginiae*). More recently BOSCHUNG & GUNTER (1962) working with specimens from Mississippi Sound found the range to be 57 to 60. ANDREWS (1893) recorded a specimen from Jamaica with only 48 myotomes, but this was regarded as an error by BIGELOW &

FARFANTE and by BOSCHUNG & GUNTER. Since in this study a specimen was found with only 50 myotomes it is not inconceivable that ANDREWS did find one with only 48 myotomes. In which case the myotome range according to ANDREWS would be 48 to 61. Figure 15 shows the range of total myotome numbers of the Jamaican specimens compared with other species of *Branchiostoma* of the Western Atlantic. The range of total myotomes for the Jamaican specimens not only overlaps other known ranges of myotomes of *B. caribaeum,* but also encompasses the other species of *Branchiostoma* of the Western Atlantic.

SUNDEVALL (1853) stated that the anus of *Branchiostoma caribaeum* was located near the midpoint of the lower caudal lobe. HUBBS (1922) stated that in *B. caribaeum, B. floridae* and *B. virginiae* the anus was located near the midpoint, but in *B. bermudae* and *B. platae* the anus was located well behind the midpoint of the lower caudal lobe. Later workers have obtained differing results – SAWAYA & CARVALHO (1950) found that in the specimens of *B. platae* they examined the anus was located near the midpoint of the lower caudal lobe; and BOSCHUNG & GUNTER (1962) found that in the specimens of *B. caribaeum* from the Mississippi Sound the position of the anus is almost always behind the midpoint of the lower caudal lobe. Of the 100 Jamaican specimens of *B. caribaeum* examined 62 percent showed the anus behind the midpoint and 38 percent showed the anus at the midpoint of the lower caudal lobe.

Therefore the position of the anus can no longer be used as a diagnostic character to separate the species of *Branchiostoma* of the Western Atlantic. However, this character does separate the Eastern Atlantic group of *Branchiostoma* species from those of the Western Atlantic, because in all of the former group (which includes *B. lanceolatum, B. senegalense, B. nigeriense* and *B. africae*) the anus is located well in advance of the midpoint of the lower caudal lobe (WEBB, 1955).

Previously reported counts of gonads on one side of *Branchiostoma caribaeum* were 22 to 29 (BIGELOW & FARFANTE, 1948). In the Jamaican specimens, the gonads varied from 20 to 28 on the right side. In the Mississippi Sound specimens of BOSCHUNG & GUNTER (1962) the gonads varied from 22 to 30 on the right side. BOSCHUNG

& GUNTER found that there was no correlation between number of gonads and size of the animal. Since all the animals used in the present study were approximately the same length, there was no data to support this. All the specimens of *B. caribaeum* from the various localities showed a similar variation in number of gonads on the right side. *B. platae* specimens showed a variation of 26 to 31 gonads, and specimens of *B. bermudae* showed a variation of 22 to 28 gonads on the right side.

Branchiostoma platae was first described by HUBBS (1922). HUBBS stated that the two main characters by which *B. platae* differed from *B. caribaeum* were the shape of the caudal fin and the position of the anus behind the midpoint of the lower caudal lobe. It has been suggested above that both the shape of the caudal fin and the position of the anus can no longer be used as distinguishing factors in determining whether a specimen is *B. caribaeum* or *B. platae.*

SAWAYA & CARVALHO worked on specimens of *Branchiostoma platae* from the coast of São Paulo, Brazil. In 1938 they recorded their specimens as *B. caribaeum.* In a later paper (1950) they re-examined the specimens of their collection and found that several specimens showed the characteristics of the species *B. caribaeum,* but most of them agreed with the characteristics of the species *B. platae* (as described by HUBBS, 1922). They found that there was a large variation in the diagnostic characters and these tended to overlap with those given by BIGELOW & FARFANTE for *B. caribaeum.*

It is therefore suggested here that *Branchiostoma platae* may be a synonym for *B. caribaeum.* Further evidence to support this lies in the fact that HUBBS believed the species of *Branchiostoma* to be more localised in their distribution than had originally been thought, and on this basis he separated the *Branchiostoma* of the Western Atlantic in five species: *B. caribaeum, B. bermudae, B. floridae, B. platae* and *B. virginiae.* Two of these species *B. floridae* and *B. virginiae* were later proved to be synonyms of *B. caribaeum* by BIGELOW & FARFANTE (1948). Therefore it is possible that a third species described by HUBBS, *B. platae,* might also be a synonym of *B. caribaeum.* Furthermore before HUBBS published his paper in 1922, all references of *Branchiostoma* from the north of the Amazon

TABLE 7

COMPARISON OF 11 TAXONOMIC CHARACTERS OF THE SPECIES OF *Branchiostoma* OF THE WESTERN ATLANTIC

1 = Total myotomes
2 = Preatriopore myotomes
3 = Postatriopore myotomes
4 = Myotomes between atriopore and anus
5 = Postanal myotomes
6 = Dorsal fin ray chambers
7 = Ventral (preanal) fin ray chambers
8 = Gonads (on one side only)
9 = Maximum body length
10 = Position of anus
11 = Origin of lower caudal lobe

SPECIES	TAXONOMIC CHARACTERS										
	1	2	3	4	5	6	7	8	9	10	11
B. caribaeum (SUNDEVALL, 1853 ANDREWS, 1893).	48–61	27–37	12–23	12–14	9	227–231	33–35	–	51 mm	Near midpoint of lower caudal lobe.	Opposite origin of upper caudal lobe.
B. caribaeum (BIGELOW & FARFANTE, 1948)	57–64	35–38	19–26	13–17	6–9	230–320	18–37	22–29	66 mm	Near midpoint of lower caudal lobe.	Opposite origin of upper caudal lobe.
B. caribaeum (BOSCHUNG & GUNTER, 1962)	57–60	35–37	20–25	14–17	6–8	252–359	35–61	22–30	52.3 mm	Behind midpoint of lower caudal lobe.	Variable: both anterior to, and opposite origin of upper caudal lobe.
B. caribaeum Jamaica (MCSHINE)	50–66	30–43	18–29	11–21	5–10	207–312	20–42	20–28	45 mm	Behind midpoint of lower caudal lobe.	Anterior to origin of upper caudal lobe.
B. bermudae (HUBBS, 1922)	54–57	34–36	18–23	12–14	6–9	172–240	17–24	22–28	53.5 mm	A little behind midpoint of lower caudal lobe.	Anterior to origin of upper caudal lobe.
B. floridae (HUBBS, 1922)	57–61	32–36	21–27	14–17	7–10	274–310	36–48	22–27	61 mm	Near midpoint of lower caudal lobe	–
B. platae (HUBBS, 1922)	62–65	38–40	23–26	14–15	9–11	283–327	22–28	26–31	56 mm	Behind midpoint of lower caudal lobe.	Anterior to origin of upper caudal lobe
B. platae (SAWAYA & CARVALHO, 1950)	55–64	34–42	14–26	9–17	5–9	249–305	22–51	16–44	–	Near midpoint of lower caudal lobe	Anterior to origin of upper caudal lobe
B. virginiae (HUBBS, 1922)	60–64	36–40	23–28	14–16	9–12	259–309	36–40	–	53 mm	Near midpoint of lower caudal lobe	–

River to the Rio de la Plata were described as *B. caribaeum* and were later described as *B. platae* only on the strength of the distribution as quoted by HUBBS. However, without further statistical analyses of populations of *B. platae* the data are insufficient to substantiate the claim that *B. platae* is a synonym of *B. caribaeum*.

In summary, Table 7 shows a comparison of eleven taxonomic characters for the species of *Branchiostoma* of the Western Atlantic. This table was produced from published data (except for the Jamaican specimens) and includes the synonomous species. The table is incomplete for some species since the data on all characters mentioned was not available. The specimens of *B. caribaeum* (particularly the Jamaican specimens) show the greatest range of variation of the eleven taxonomic characters, while specimens of *B. platae* (HUBBS, 1922) show the smallest range of variation of the taxonomic characters. It is concluded that the species of *Branchiostoma* of the Western Atlantic are so similar that no one characteristic, no matter how small the variation can be used to separate them unequivocally. Therefore statistical analyses of all populations of *Branchiostoma* are necessary for a complete diagnosis.

SUMMARY

1. The original descriptions of *Branchiostoma caribaeum* are reviewed and the synonyms for the species mentioned.
2. A statistical analysis was carried out on twelve taxonomic characters of specimens of *B. caribaeum* from Kingston Harbour, Jamaica. The twelve characters were: total myotomes; preatriopore myotomes; postatriopore myotomes; myotomes between atriopore and anus; postanal myotomes; caudal fin length as a percentage of total body length; body depth as a percentage of total body length; dorsal fin ray chambers; ventral (preanal) fin ray chambers; gonads (on right side only); buccal cirri (on right side only).
3. The characters were ranked in order of increasing variation or decreasing taxonomic significance. The least variable and therefore the most important diagnostic character was found to be the number of preatriopore myotomes. This character cannot be used on its own to separate *B. caribaeum* from the other species of *Branchiostoma* of the Western Atlantic.
4. All the specimens of *B. caribaeum* found in Kingston Harbour show the origin of the upper lobe of the caudal fin considerably posterior to the lower lobe. The variability of the caudal fin shape within the species *B. caribaeum* is discussed. It is concluded that the shape of the caudal fin cannot be used as a diagnostic character to separate the species of *Branchiostoma* of the Western Atlantic.

5. The position of the anus in the majority (62 percent) of the specimens examined was behind the midpoint of the lower caudal lobe. The other 38 percent showed the anus at the midpoint of the lower caudal lobe. The variability of the position of the anus both within the species *B. caribaeum* and in the species of *Branchiostoma* of the Western Atlantic is discussed. It is also concluded that the position of the anus can no longer be used as a diagnostic character to separate the species of *Branchiostoma* of the Western Atlantic. This character does however, separate the Eastern Atlantic group of *Branchiostoma* species from those of the Western Atlantic, because in all the former groups the anus is located well in advance of the midpoint of the lower caudal lobe.
6. It is suggested here that *B. platae* may be a synonym for *B. caribaeum*. The main reason for this is that HUBBS (1922) stated that the two main characters by which *B. platae* differed from *B. caribaeum* were the shape of the caudal fin and the position of the anus behind the midpoint of the lower caudal lobe. It has been shown above that both these characters can no longer be used as distinguishing factors in determining whether a specimen is *B. caribaeum* or *B. platae*.
7. It is concluded that the species of *Branchiostoma* of the Western Atlantic are so similar that no one characteristic no matter how small the variation can be used to separate them unequivocally. Therefore statistical analysis of all populations of *Branchiostoma* are necessary for a complete diagnosis.

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