Physical Data from a Study of Size, Weight and Gonad Quality for the Green Sea Urchin *(Strongylocentrotus dröbachiensis) over a One-Year Period*

by
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NO. 1476

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INTRODUCTION

Although the red sea urchin, Strongylocentrotus franciscanus is presently the only species of sea urchin which has been harvested commercially in British Columbia, the green sea urchin, Strongylocentrotus dröbachiensis, appears to be abundant enough to support a fishery. In fact, the smaller size of the green urchin makes the "roe" from this species more acceptable on the Japanese market than that from S. franciscanus since it is more similar in size to Japanese urchins. Bedard (1973) indicates that "roe" from S. dröbachiensis is suitable for the "Sushi" (raw fish on rice) trade which accounts for the majority of world roe consumption. According to Sandeman (1977), France will buy "roe" from this species as long as quality requirements can be met.

The general distribution of S. dröbachiensis on the Pacific and Atlantic coasts of North America is discussed by Mottet (1976). In British Columbia, this species is found all along the coast, from Prince Rupert to the southern tip of Vancouver Island. S. dröbachiensis is the only species of sea urchin found on the Atlantic coast of Canada and the biology, harvesting and shipping of this species have been studied with a view to development of a fishery there (Bedard, 1973; Miller and Bishop, 1973; Fletcher, Scaplen, Buggeln and Idler, 1974; Fletcher, Pepper and Kean, 1974; Fletcher and Haggerty, 1975; Fowler and Fletcher, 1975). Foods and predators of S. dröbachiensis in Newfoundland have been studied by Himmelman and Steele (1971).

Data on physical characteristics and seasonal gonad changes of S. dröbachiensis are needed if this species is to be used commercially. In an extensive review entitled "The Fishery Biology of Sea Urchins in the Family Strongylocentrotidae" Mottet (1976) has covered such topics as anatomy, feeding habits, defenses, gonadal development, fishing methods, fishery management and preparation for use as a food product for several sea urchin species. Vadas (1968) reported size and gonad weight data for S. dröbachiensis found around the San Juan Islands. Stephens (1972) studied gonad index and ripeness in this species collected from the waters of Massachusetts and Maine.

This report, an extension of the information given in a previous manuscript report on S. franciscanus (Kramer and Nordin, 1975), presents size, weight and gonad quality data over a one-year period for medium to large green sea urchins. Ten physical characteristics were measured on a sample of 103 to 105 S. drōbachiensis per month.

MATERIALS AND METHODS

I. Sampling area and collecting procedures

Samples of S. drōbachiensis (103 to 105 individuals) were collected near the middle of each month (the 15th when possible) from May 1975 to May 1976 in 10 to 30 feet of water near Albert Head on Vancouver Island. The method of collection is described in Manuscript Report #1372 (Kramer and Nordin, 1975); however, in this case, a diver's "goody bag" was used for collection rather than a laundry basket. About 30 to 40 urchins were gathered per dive and were transported in an 8-gallon covered plastic container. Only medium to large urchins were taken (5 to 8 cm in diameter).

II. Methods

Test diameter, test height, total drained weight, gonad weight, gonadal yield, sex and gonad color, condition and maturity were recorded for each specimen as previously described (Kramer and Nordin, 1975). Total drained weight and gonad weight were determined using a Mettler 800-gm capacity top-loading balance. Gonad color was recorded and ranged from light or pale yellow to a copper color.

RESULTS

I. Monthly drained weight, gonad weight and gonadal yield

Data for each monthly sampling of S. drōbachiensis are given in the Appendix. Table I gives monthly averages of this data for drained weight, gonad weight and gonadal yield.

Drained weight was, in general, lower during the summer months of 1975, then increased through the fall and remained fairly high during the winter months of 1975-1976. The changes seem to correspond to changes in the gonad weight, which was at a minimum in May, June and July and peaked in December and January. However the gradual increase and decrease found in average gonad weight is not found in the average drained weight. The erratic changes (e.g. the lower than expected value for February and the higher than expected value for May of 1976) are no doubt due to the chance collection of smaller or larger urchins as no effort was made to get a uniform size. Little difference was found between males and females for drained weight. Females, however, reached a higher gonad weight than did the males and their peak occurred slightly later.

Maximum gonadal yield occurred from November to February while April to August showed the lowest gonad weights and gonadal yields. As with gonad weight, females attained higher gonadal yields than males and the peak values occurred later for females than for males. By June and July most of the urchins had reached minimum gonadal yields, as shown by the lower standard deviations for these months. The gonadal yield in winter was more than three times the summer gonadal yield.

II. Monthly gonad color, condition and maturity

Tables II, III and IV give the monthly data for S. drobachiensis on color, condition and maturity of the gonads.

Tables IIA, IIB and IIC indicate there are no seasonal gonad color variations in males or females throughout the year. The male gonads are generally light (pale) yellow, golden yellow or copper in color. Female gonads are light (pale) yellow or yellow-orange. The "roe" in females is, in general, more brightly colored and more acceptable. From April to July, the percentage of dark- or dirty-colored gonads in males is much higher than for the rest of the year, corresponding to minimum gonad weight and gonadal yield data for these months. In females, the period from March to June has the largest percentage of dark- or dirty-colored "roe", slightly preceding the minimum in gonad weight and gonadal yield which occurred from April to August.

The mottled coloration (which appears as purplish brown patches on one or more gonad segments) was seen more often in males than in females.

Tables IIIA, IIIB and IIIC show that gonads were firmest from September to January for both male and female S. dröbachiensis. During this period twice as many urchins had firm "roe" as had soft "roe". More females were observed to have extremely firm "roe" than males over the one-year period.

Tables IVA, IVB and IVC, showing monthly gonad maturity for S. dröbachiensis, give an indication of the reproductive cycle in this species. In May 1975, a majority of the urchins had degenerate gonads, showing that those individuals had spawned. From June to August an increasing percentage of gonads were not ripe. By September, few degenerate gonads were found, indicating spawning was completed and the gonads were recovering. This trend continued from October 1975 through February 1976 as the urchins prepared for spawning. During this period the percentage of samples that were not ripe decreased from 83% to 26% while the ripe to extremely ripe samples increased from 14% to 74%. The appearance of degenerate gonads in March and the maximum of extremely ripe urchins indicates spawning had already been completed by a few of the urchins and was about to begin in others. The drop in percentage of ripe to extremely ripe urchins in April and May shows spawning was still taking place during these months. The high percentage of not ripe and ripe to extremely ripe samples in May 1976 compared to May 1975 suggests that spawning took place over a longer period of time in 1976 and was completed slightly later. Although spawning appeared to begin in March, it is difficult to be sure which sex spawned earlier; in February, 89% of males had ripe gonads compared to 54% of females but by March more females than males were degenerate (17% and 4% respectively). It appears that females started spawning slightly later but finished earlier. For all months except those immediately after spawning, a higher percentage of males than females were classified as ripe to extremely ripe.

III. Relationships between test diameter, test height, drained weight and gonad weight

The plots in Figures 1 - 4 of test diameter versus test height, test diameter versus drained weight, test diameter versus gonad weight and drained weight versus gonad weight have been regressed to straight line equations since the data appear to best fit linear equations. Table V gives linear regression formulas and correlation coefficients for these lines.

From Table V, it is clear that the test diameter versus drained weight data has the best correlation to linear regression, followed by test diameter versus test height, then drained weight versus gonad weight. The test diameter versus gonad weight data show the poorest correlation. The high correlation coefficients for Figures 1 and 2 indicate that one can approximate test height from test diameter (and vice versa) and drained weight from test diameter using the regression equations. Table V (C and D) and Figures 3 and 4 show that during recovery from spawning (September through February) the correlation coefficients are high enough to predict gonad weight from either test diameter or drained weight, but the latter estimation will be more accurate. Around spawning time, however, the low correlation coefficients for these two regressions indicate the approximations would not be very accurate. This is to be expected as the urchins in our March, April and May samplings were in various stages of spawning — some degenerate, with low gonad weights and some still ripe, with high gonad weights (see Table VC and Figures 3K - 3M, 4L and 4M).

Figures 1A - 1M and 2A - 2M show very little change in slope and y-intercept with time of year, indicating little seasonal variation in the test diameter versus test height and test diameter versus drained weight relationships. Figures 3A - 3M and 4A - 4M have less steep slopes in the summer months (April to August) as gonad weights decrease significantly during spawning.

Table I. Monthly averages for drained weight, gonad weight and gonadal yield.

	Average Drained Weight (gm)			Average Gonad Weight (gm)			Average Gonadal Yield* (%)		
Month	Male	Female	All Urchins	Male	Female	All Urchins	Male	Female	All Urchins
May/75	60.4	61.0	60.7	5.4	4.7	5.0	8.6(4.7)	7.3(4.3)	7.8(4.5)
Jun	62.6	61.0	61.8	5.7	5.5	5.6	8.8(3.9)	8.8(3.4)	8.8(3.6)
Jul	60.6	61.8	61.3	6.1	7.2	6.7	9.8(4.1)	11.6(3.7)	10.8(4.0)
Aug	64.7	58.5	61.4	8.6	8.0	8.3	13.0(5.2)	13.3(4.2)	13.2(4.6)
Sept	68.8	67.6	68.0	13.1	12.7	12.8	18.7(5.9)	18.4(4.2)	18.6(4.9)
Oct	68.3	67.2	67.6	13.8	13.5	13.6	19.8(5.2)	19.5(4.9)	19.6(5.0)
Nov	78.8	78.7	78.7	18.6	16.0	17.3	23.4(4.6)	20.4(4.1)	22.0(4.6)
Dec	72.3	74.8	73.6	18.0	18.3	18.2	24.6(4.8)	24.7(4.9)	24.6(4.9)
Jan/76	71.0	71.4	71.2	17.5	19.5	18.5	24.7(3.8)	26.5(6.8)	25.6(5.6)
Feb	61.0	71.6	65.4	14.0	22.5	17.5	22.4(4.5)	30.8(5.6)	25.9(6.5)
Mar	74.1	82.8	79.1	13.9	17.6	16.0	18.5(4.5)	20.7(8.2)	19.8(6.9)
Apr	66.4	68.6	67.5	7.2	8.2	7.7	11.2(6.6)	11.4(9.7)	11.3(8.3)
May	72.6	73.6	73.1	6.2	6.1	6.1	8.5(4.1)	8.0(4.5)	8.2(4.3)

* Standard deviations are given in parentheses.

Table IIA. Monthly gonad color for S. dröbachiensis (male) as a percentage of the urchins sampled that month.

Month	Light or Pale Yellow		Yellow		Yellow-Orange		Golden Yellow		Copper		Mottled (One or More Segments)
	Bright or Clean	Dull or Dirty	Bright or Clean	Dark or Dirty	Bright or Clean	Dark or Dirty	Bright or Clean	Dark or Dirty	Bright or Clean	Dark or Dirty	
May/75	4.6	9.1	---	11.4	15.9	15.9	4.5	6.8	6.8	25.0	4.5
Jun	5.4	---	---	12.7	9.1	5.4	9.1	16.4	5.4	36.4	5.4
Jul	11.1	4.4	2.2	13.3	22.2	2.2	11.1	8.9	8.9	15.6	2.2
Aug	12.5	2.1	2.1	8.3	6.2	----	16.7	20.8	22.9	8.3	2.1
Sept	24.3	5.4	2.7	5.4	2.7	5.4	8.1	18.9	27.0	----	----
Oct	20.9	---	2.3	----	2.3	----	9.3	16.3	30.2	18.6	----
Nov	30.2	9.4	1.9	1.9	5.7	----	17.0	3.8	18.9	11.3	5.7
Dec	49.0	5.9	---	----	----	----	13.7	----	27.4	3.9	----
Jan/76	28.8	1.9	---	----	----	----	21.2	7.7	38.5	1.9	1.9
Feb	48.4	1.6	---	----	----	----	6.4	1.6	29.0	12.9	16.1
Mar	31.1	8.9	---	----	----	----	----	----	48.9	11.1	4.4
Apr	30.0	---	---	6.0	2.0	----	4.0	6.0	14.0	38.0	14.0
May	12.2	---	---	8.2	2.0	4.1	6.1	----	32.6	34.7	8.2

Table IIB. Monthly gonad color for S. drobachiensis (female) as a percentage of the urchins sampled that month.

Month	Light or Pale Yellow		Yellow		Yellow-Orange		Golden Yellow		Copper		Mottled (One or More Segments)
	Bright or Clean	Dull or Dirty	Bright or Clean	Dark or Dirty	Bright or Clean	Dark or Dirty	Bright or Clean	Dark or Dirty	Bright or Clean	Dark or Dirty	
May/75	10.2	3.4	16.9	55.9	5.1	8.5	---	---	---	---	1.7
Jun	22.4	2.0	24.5	36.7	8.2	4.1	---	2.0	---	---	6.1
Jul	25.4	1.7	55.9	15.2	----	---	---	---	---	1.7	1.7
Aug	12.5	1.8	28.6	23.2	28.6	1.8	3.6	---	---	---	1.8
Sept	17.9	6.0	32.8	17.9	19.4	4.5	1.5	---	---	---	1.5
Oct	16.4	4.9	36.1	18.0	24.6	---	---	---	---	---	1.6
Nov	5.9	---	62.7	23.5	7.8	---	---	---	---	---	---
Dec	9.4	1.9	28.3	22.6	35.8	1.9	---	---	---	---	1.9
Jan/76	7.7	---	61.5	23.1	7.7	---	---	---	---	---	1.9
Feb	4.6	---	55.8	27.9	11.6	---	---	---	---	---	2.3
Mar	10.2	1.7	40.7	47.5	----	---	---	---	---	---	1.7
Apr	----	1.8	25.9	61.1	7.4	3.7	---	---	---	---	---
May	5.4	5.4	10.9	65.4	7.3	3.6	---	---	---	1.8	---

Table IIC. Monthly gonad color for S. dröbachiensis as a percentage of the urchins sampled that month.

Month	Light or Pale Yellow		Yellow		Yellow-Orange		Golden Yellow		Copper		Mottled (One or More Segments)
	Bright or Clean	Dull or Dirty	Bright or Clean	Dark or Dirty	Bright or Clean	Dark or Dirty	Bright or Clean	Dark or Dirty	Bright or Clean	Dark or Dirty	
May/75	7.8	5.8	9.7	36.8	9.7	11.6	1.9	2.9	2.9	10.7	2.9
Jun	9.2	0.6	7.8	16.3	5.9	3.3	3.3	6.5	2.0	13.1	3.9
Jul	19.2	2.9	32.7	14.4	9.6	1.0	4.8	3.8	3.8	7.7	1.9
Aug	12.5	1.9	16.3	16.3	18.3	1.0	9.6	9.6	10.6	3.8	1.9
Sept	20.2	5.8	22.1	13.5	13.5	4.8	3.8	6.7	9.6	---	1.0
Oct	18.3	2.9	22.1	10.6	15.4	---	3.8	6.7	12.5	7.7	1.0
Nov	18.3	4.8	31.7	12.5	6.7	---	8.6	1.9	9.6	5.8	2.9
Dec	28.8	3.8	14.4	11.5	18.3	1.0	6.7	---	13.5	1.9	1.0
Jan/76	18.3	1.0	30.8	11.5	3.8	---	10.6	3.8	19.2	1.0	1.9
Feb	30.5	1.0	22.8	11.4	4.8	---	3.8	1.0	17.1	7.6	10.5
Mar	19.2	4.8	23.1	26.9	---	---	---	---	21.2	4.8	2.9
Apr	14.4	1.0	13.5	34.6	4.8	1.9	1.9	2.9	6.7	18.3	6.7
May	8.6	2.9	5.8	38.5	4.8	3.8	2.9	---	15.4	17.3	3.8

Table IIIA. Monthly gonad condition for S. dröbachiensis (male) as a percentage of the urchins sampled that month.

Month	Extremely Firm	Very Firm	Firm	Slightly Soft	Soft	Very Soft	Extremely Soft and Mushy
May/75	---	6.8	11.4	43.2	22.7	13.6	2.2
Jun	---	3.6	18.2	45.4	20.0	12.7	---
Jul	---	4.4	35.6	51.1	8.9	----	---
Aug	2.1	12.5	37.5	47.9	----	----	---
Sept	2.7	18.9	62.2	13.5	2.7	----	---
Oct	---	14.0	55.8	27.9	2.3	----	---
Nov	---	28.3	43.4	26.4	1.9	----	---
Dec	---	9.8	51.0	25.5	13.7	----	---
Jan/76	---	15.4	44.2	32.7	1.9	5.8	---
Feb	3.2	14.5	32.3	33.9	14.5	1.6	---
Mar	---	2.2	42.2	40.0	13.3	2.2	---
Apr	---	2.0	36.0	50.0	10.0	2.0	---
May	2.0	12.2	38.8	38.8	4.1	4.1	---

Table IIIB. Monthly gonad condition for S. dröbachiensis (female) as a percentage of the urchins sampled that month.

Month	Extremely Firm	Very Firm	Firm	Slightly Soft	Soft	Very Soft	Extremely Soft and Mushy
May/75	1.7	----	23.7	37.3	20.3	15.2	1.7
Jun	2.0	8.2	18.4	34.7	14.3	18.4	4.1
Jul	1.7	5.1	23.7	42.4	23.7	3.4	---
Aug	5.4	8.9	37.5	39.3	7.1	1.8	---
Sept	1.5	17.9	43.3	28.4	3.0	3.0	3.0
Oct	3.3	18.0	42.6	32.8	3.3	----	---
Nov	2.0	17.6	52.9	23.5	2.0	2.0	---
Dec	13.2	17.0	45.3	18.9	3.8	1.9	---
Jan/76	3.8	17.3	44.2	32.7	1.9	----	---
Feb	16.3	11.6	27.9	32.6	9.3	2.3	---
Mar	1.7	3.4	35.6	33.9	15.2	10.2	---
Apr	1.8	5.6	25.9	53.7	13.0	----	---
May	1.8	9.1	27.3	32.7	23.6	5.4	---

Table IIIC. Monthly gonad condition for S. dröbachiensis as a percentage of the urchins sampled that month.

Month	Extremely Firm	Very Firm	Firm	Slightly Soft	Soft	Very Soft	Extremely Soft and Mushy
May/75	1.0	2.9	18.4	39.8	21.4	14.6	1.9
Jun	1.0	5.8	18.3	40.4	17.3	15.4	1.9
Jul	1.0	4.8	28.8	46.2	17.3	1.9	---
Aug	3.8	10.6	37.5	43.3	3.8	1.0	---
Sept	1.9	18.3	50.0	23.1	2.9	1.9	1.9
Oct	1.9	16.4	48.1	30.8	2.9	----	---
Nov	1.0	23.1	48.1	25.0	1.9	1.0	---
Dec	6.7	13.5	48.1	22.1	8.6	1.0	---
Jan/76	1.9	16.4	44.2	32.7	1.9	2.9	---
Feb	8.6	13.3	30.5	33.3	12.4	1.9	---
Mar	1.0	2.9	38.5	36.5	14.4	6.7	---
Apr	1.0	3.8	30.8	51.9	11.5	1.0	---
May	1.9	10.6	32.7	35.6	14.4	4.8	---

Table IVA. Monthly gonad maturity for S. dröbachiensis (male) as a percentage of the urchins sampled that month.

Month	Extremely Degenerate	Very Degenerate	Degenerate	Not Ripe	Ripe	Very Ripe	Extremely Ripe
May/75	13.6	4.5	36.4	31.8	6.8	6.8	----
Jun	3.6	16.4	10.9	67.3	1.8	----	----
Jul	2.2	4.4	6.7	86.7	----	----	----
Aug	----	----	6.2	93.8	----	----	----
Sept	----	----	5.4	91.9	2.7	----	----
Oct	----	2.3	4.6	72.1	18.6	2.3	----
Nov	----	----	----	41.5	49.1	9.4	----
Dec	----	----	----	13.7	62.7	17.6	5.9
Jan/76	----	----	----	----	50.0	28.8	21.2
Feb	----	----	----	11.3	33.9	38.7	16.1
Mar	----	----	4.4	11.1	48.9	28.9	6.7
Apr	6.0	4.0	24.0	6.0	32.0	12.0	16.0
May	2.0	2.0	24.5	44.9	18.4	8.2	----

Table IVB. Monthly gonad maturity for S. dröbachiensis (female) as a percentage of the urchins sampled that month.

Month	Extremely Degenerate	Very Degenerate	Degenerate	Not Ripe	Ripe	Very Ripe	Extremely Ripe
May/75	5.1	13.6	49.2	27.1	----	3.4	1.7
Jun	4.1	14.3	8.2	73.5	----	----	----
Jul	---	1.7	5.1	93.2	----	----	----
Aug	---	----	----	100.0	----	----	----
Sept	---	----	3.0	92.5	4.5	----	----
Oct	---	----	----	90.2	9.8	----	----
Nov	---	----	2.0	94.1	3.9	----	----
Dec	---	----	----	75.5	22.6	1.9	----
Jan/76	---	----	----	78.8	21.2	----	----
Feb	---	----	----	46.5	44.2	7.0	2.3
Mar	1.7	----	15.2	3.4	28.8	22.0	28.8
Apr	1.8	16.7	33.3	5.6	20.4	13.0	9.3
May	1.8	7.3	27.3	50.9	7.3	1.8	3.6

Table IVC. Monthly gonad maturity for S. dröbachiensis as a percentage of the urchins sampled that month.

Month	Extremely Degenerate	Very Degenerate	Degenerate	Not Ripe	Ripe	Very Ripe	Extremely Ripe
May/75	8.7	9.7	43.7	29.1	2.9	4.8	1.0
Jun	3.8	15.4	9.6	70.2	1.0	----	----
Jul	1.0	2.9	5.8	90.4	----	----	----
Aug	---	----	2.9	97.1	----	----	----
Sept	---	----	3.8	92.3	3.8	----	----
Oct	---	1.0	1.9	82.7	13.5	1.0	----
Nov	---	----	1.0	67.3	26.9	4.8	----
Dec	---	----	----	45.2	42.3	9.6	2.9
Jan/76	---	----	----	39.4	35.6	14.4	10.6
Feb	---	----	----	25.7	38.1	25.7	10.5
Mar	1.0	----	10.6	6.7	37.5	25.0	19.2
Apr	3.8	10.6	28.8	5.8	26.0	12.5	12.5
May	1.9	4.8	26.0	48.1	12.5	4.8	1.9

Table V. Linear regression formulas and correlation coefficients for Figures 1-4.

Month	Regression Formula	Correlation Coefficient (r)
A. Test diameter versus test height.		
May/75	y= 0.51x + 0.10	0.89
Jun	y= 0.50x + 0.02	0.86
Jul	y= 0.53x - 0.09	0.91
Aug	y= 0.44x + 0.43	0.83
Sept	y= 0.48x + 0.29	0.91
Oct	y= 0.51x + 0.06	0.86
Nov	y= 0.47x + 0.30	0.85
Dec	y= 0.47x + 0.32	0.86
Jan/76	y= 0.44x + 0.37	0.89
Feb	y= 0.50x + 0.07	0.89
Mar	y= 0.48x + 0.21	0.81
Apr	y= 0.49x + 0.17	0.88
May	y= 0.39x + 0.75	0.75
B. Test diameter versus drained weight.		
May/75	y= 23.22x - 84.02	0.93
Jun	y= 24.02x - 91.02	0.94
Jul	y= 24.28x - 90.55	0.95
Aug	y= 23.45x - 85.11	0.94
Sept	y= 25.81x - 96.28	0.96
Oct	y= 26.16x - 102.24	0.93
Nov	y= 25.07x - 91.51	0.94
Dec	y= 25.41x - 93.30	0.94
Jan/76	y= 25.55x - 94.17	0.92
Feb	y= 26.66x - 103.64	0.93
Mar	y= 27.91x - 109.06	0.87
Apr	y= 21.07x - 68.56	0.82
May	y= 25.83x - 101.92	0.89

Table V. (Continued)

Month	Regression Formula	Correlation Coefficient (r)
C. Test diameter versus gonad weight.		
May/75	y= 2.34x - 9.54	0.49
Jun	y= 2.62x - 11.09	0.63
Jul	y= 2.58x - 9.39	0.58
Aug	y= 3.58x - 14.08	0.56
Sept	y= 5.11x - 19.67	0.73
Oct	y= 6.41x - 28.02	0.73
Nov	y= 4.84x - 15.50	0.61
Dec	y= 5.67x - 19.04	0.68
Jan/76	y= 7.20x - 28.08	0.71
Feb	y= 8.66x - 37.43	0.73
Mar	y= 5.57x - 21.58	0.45
Apr	y= 0.52x + 4.39	0.06
May	y= 2.13x - 8.32	0.32
D. Drained weight versus gonad weight.		
May/75	y= 0.12x - 2.23	0.62
Jun	y= 0.12x - 1.52	0.70
Jul	y= 0.11x - 0.24	0.65
Aug	y= 0.18x - 2.94	0.70
Sept	y= 0.22x - 1.83	0.82
Oct	y= 0.26x - 4.21	0.85
Nov	y= 0.22x - 0.01	0.74
Dec	y= 0.24x + 0.56	0.78
Jan/76	y= 0.31x - 3.53	0.85
Feb	y= 0.36x - 6.30	0.88
Mar	y= 0.27x - 5.37	0.70
Apr	y= 0.12x - 0.41	0.34
May	y= 0.11x - 1.62	0.46

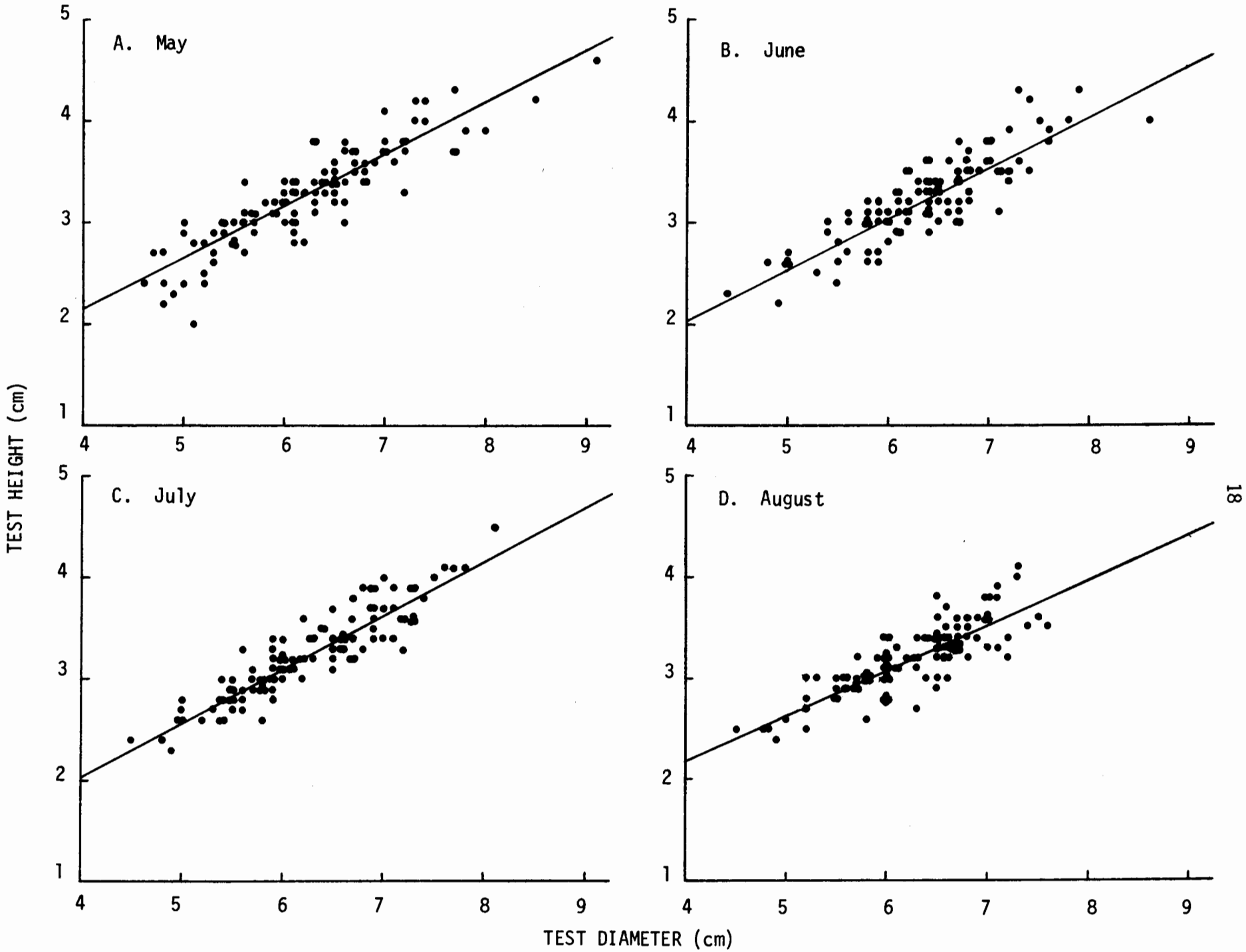

Fig. 1. Test diameter versus test height for May - August 1975 (S. dröbachiensis)

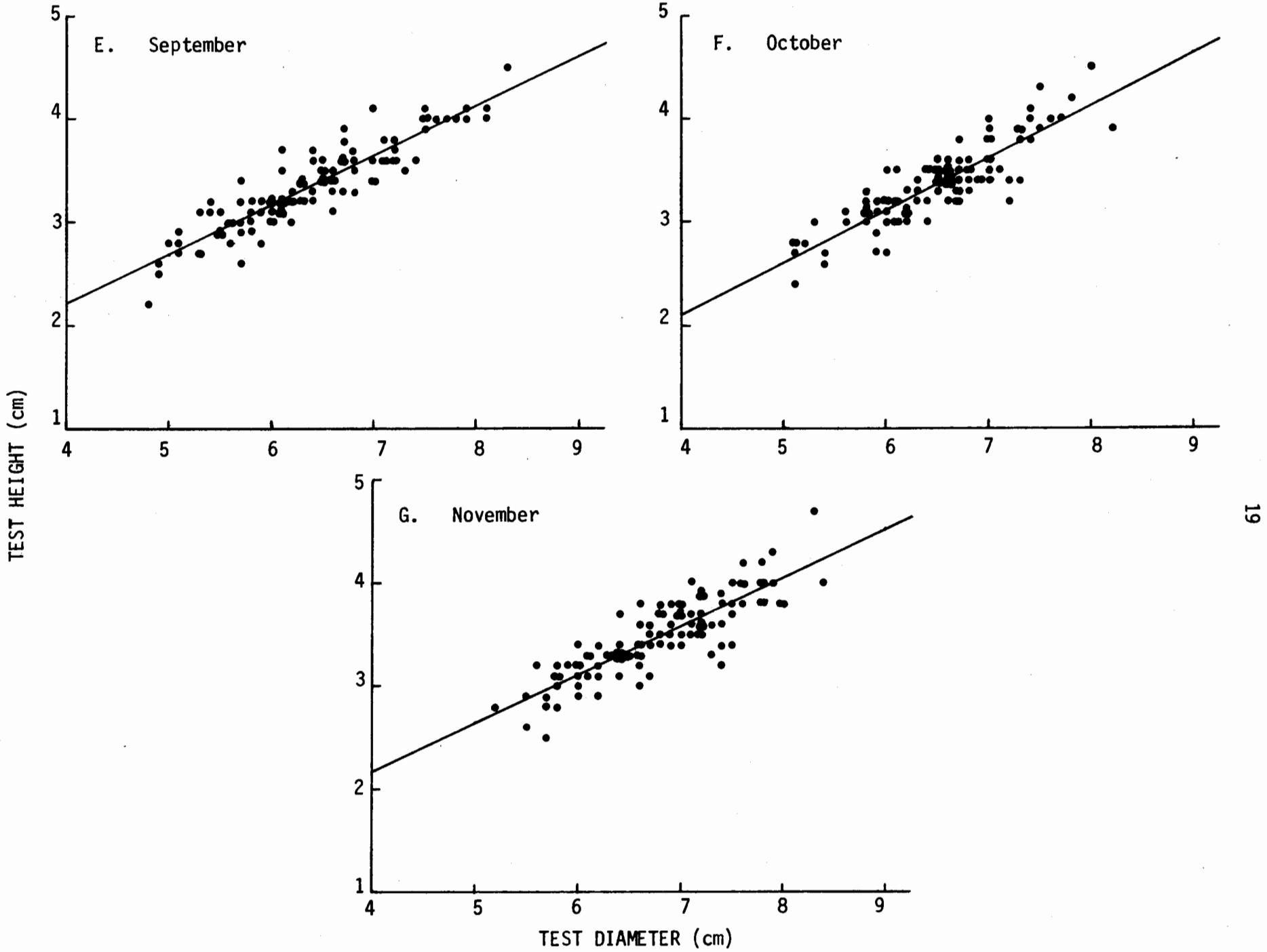

Fig. 1. (cont'd) - Test diameter versus test height for September - November 1975 (S. dröbachiensis)

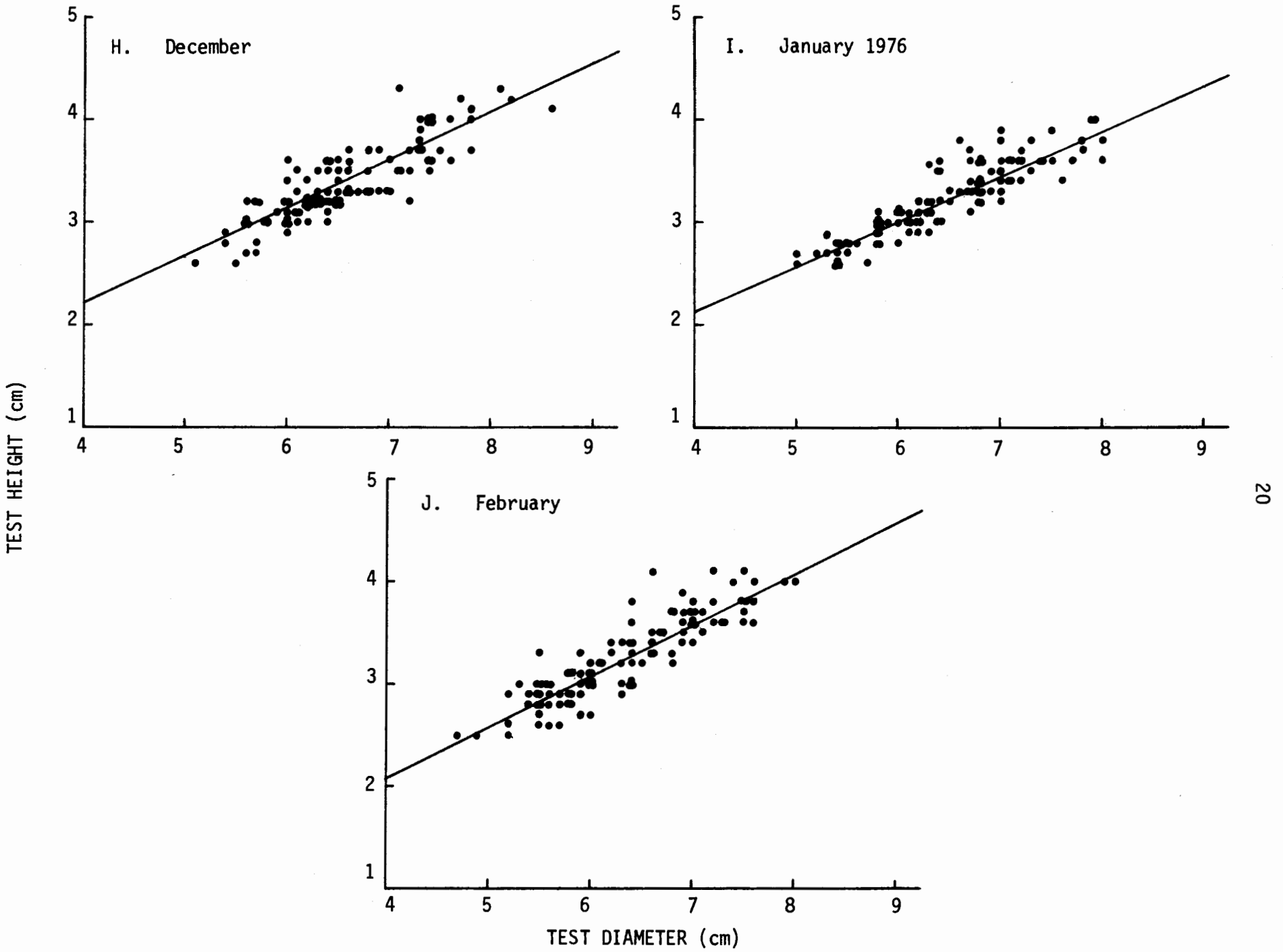

Fig. 1. (cont'd) - Test diameter versus test height for December 1975 - February 1976 (S. dröbachiensis)

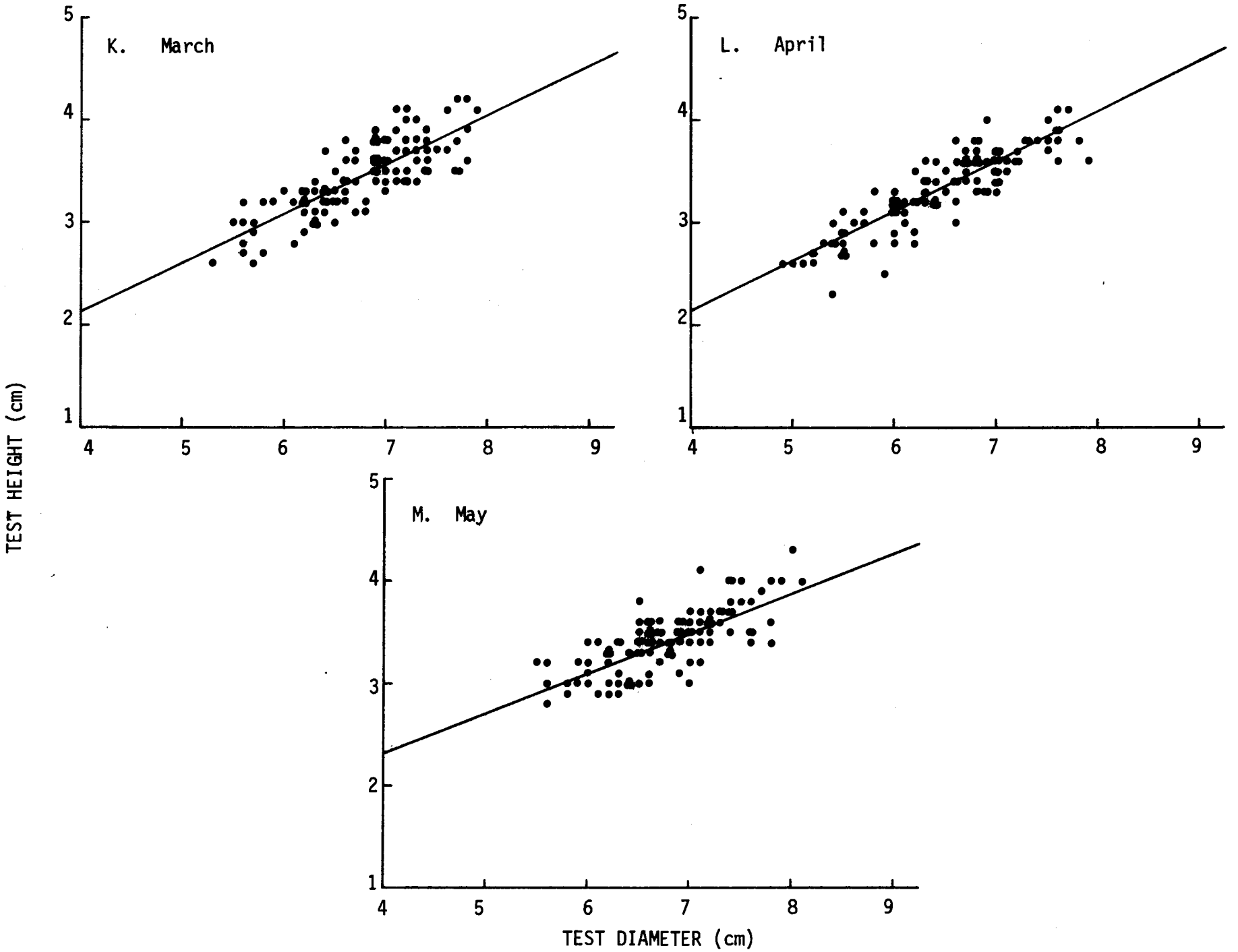

Fig. 1. (cont'd) - Test diameter versus test height for March - May 1976 (S. dröbachiensis)

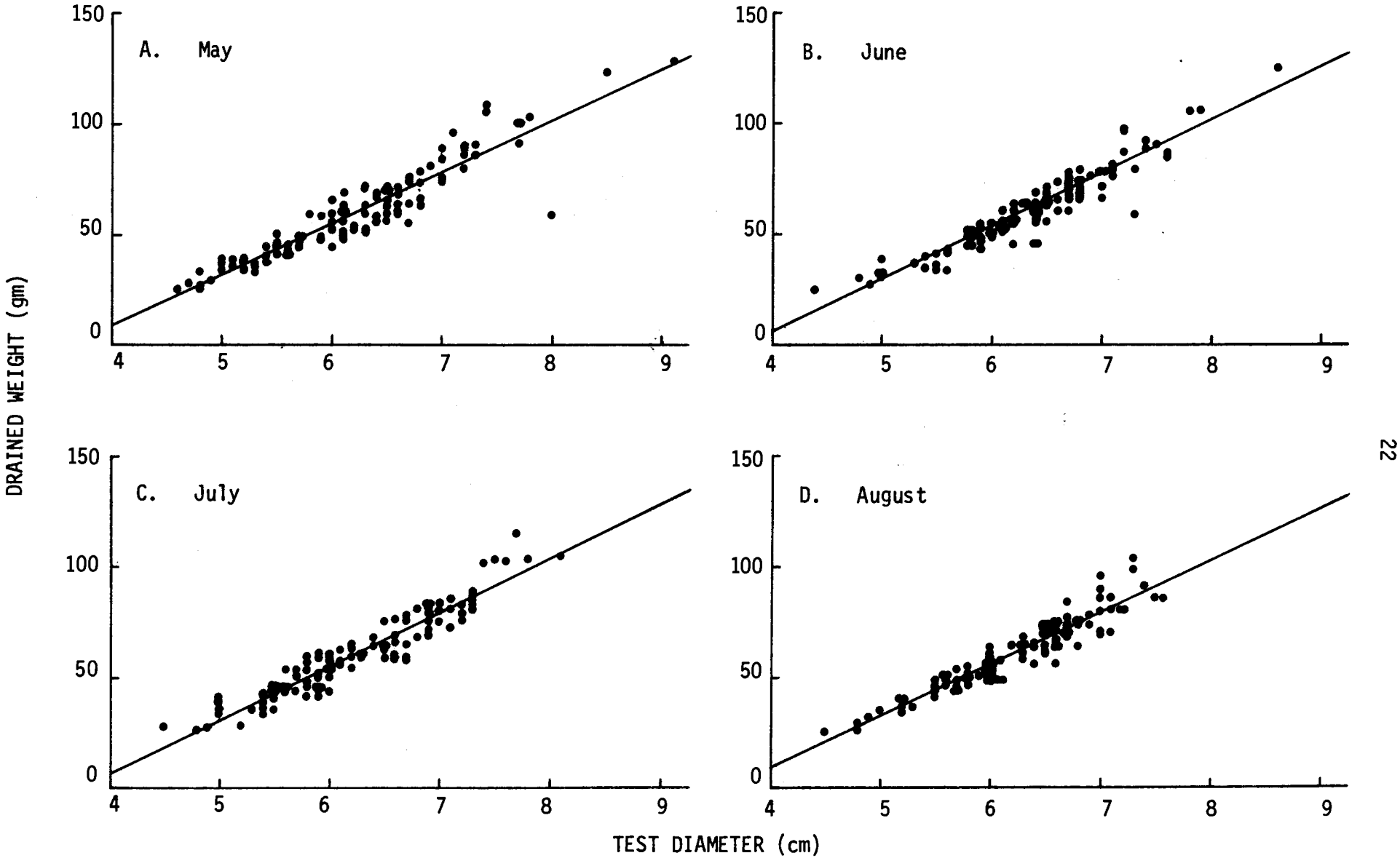

Fig. 2. Test diameter versus drained weight for May - August 1975 (S. dröbachiensis)

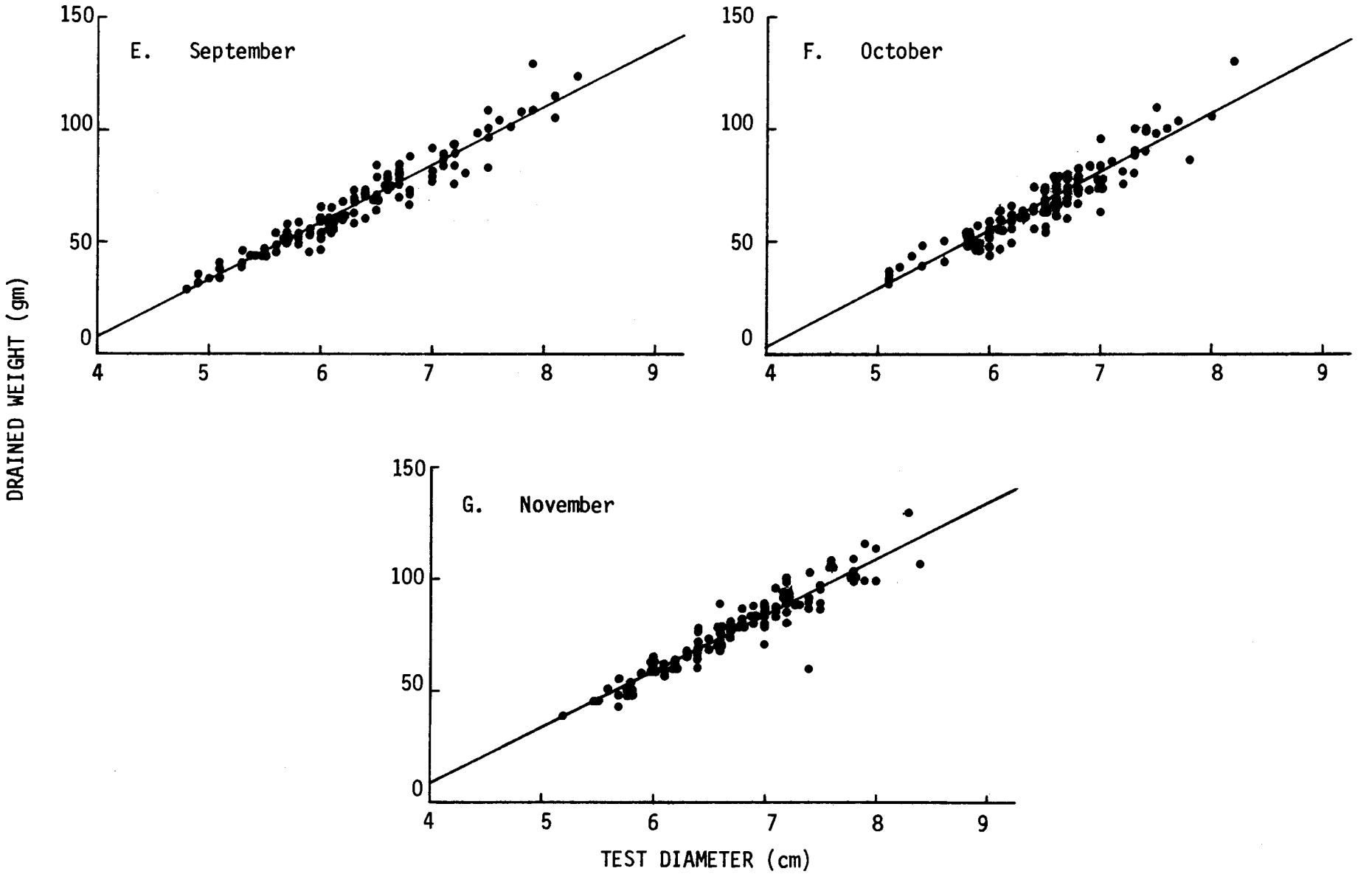

Fig. 2. (cont'd) - Test diameter versus drained weight for September - November 1975 (S. dröbachiensis)

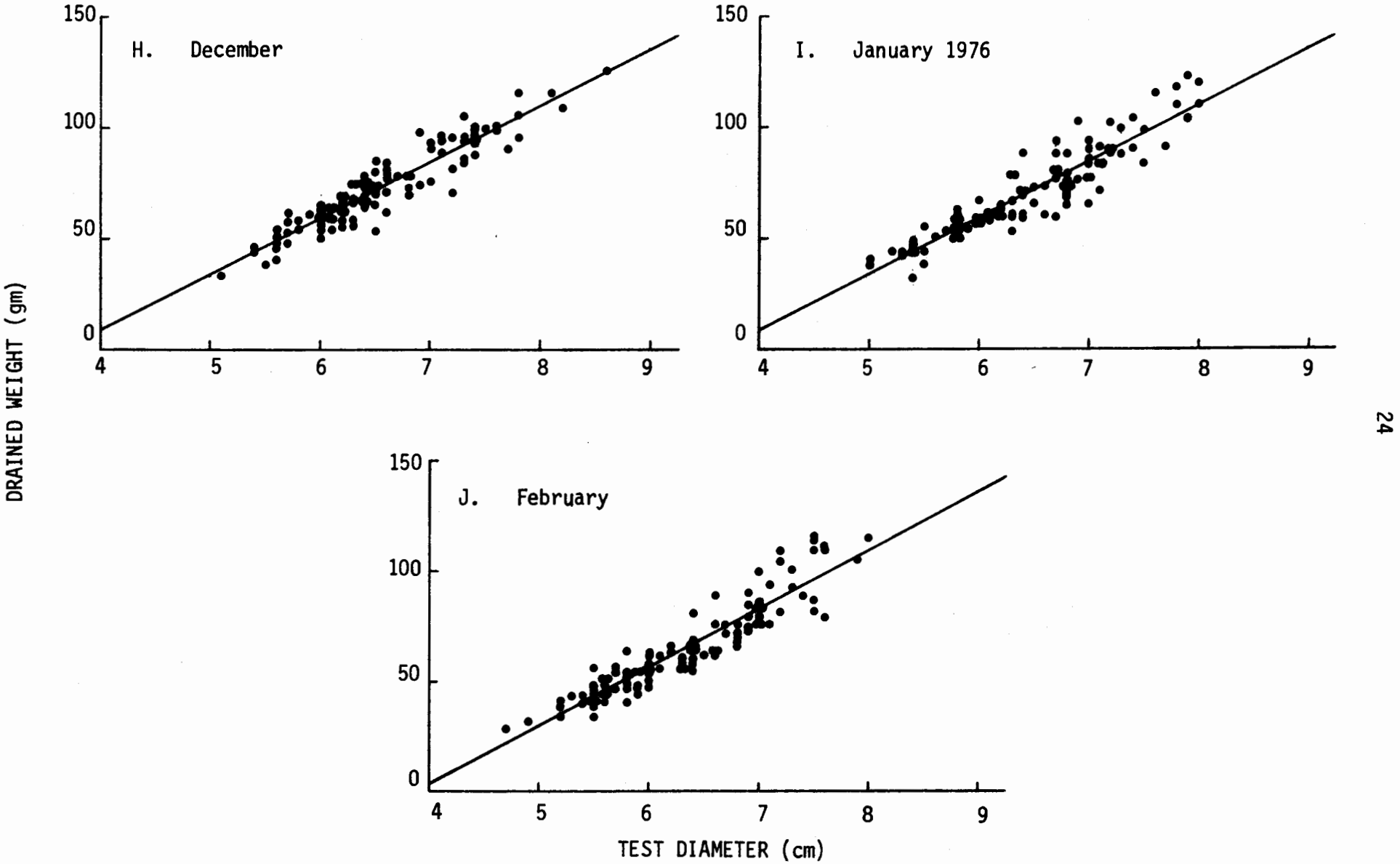

Fig. 2. (cont'd) - Test diameter versus drained weight for December 1975 - February 1976 (S. dröbachiensis)

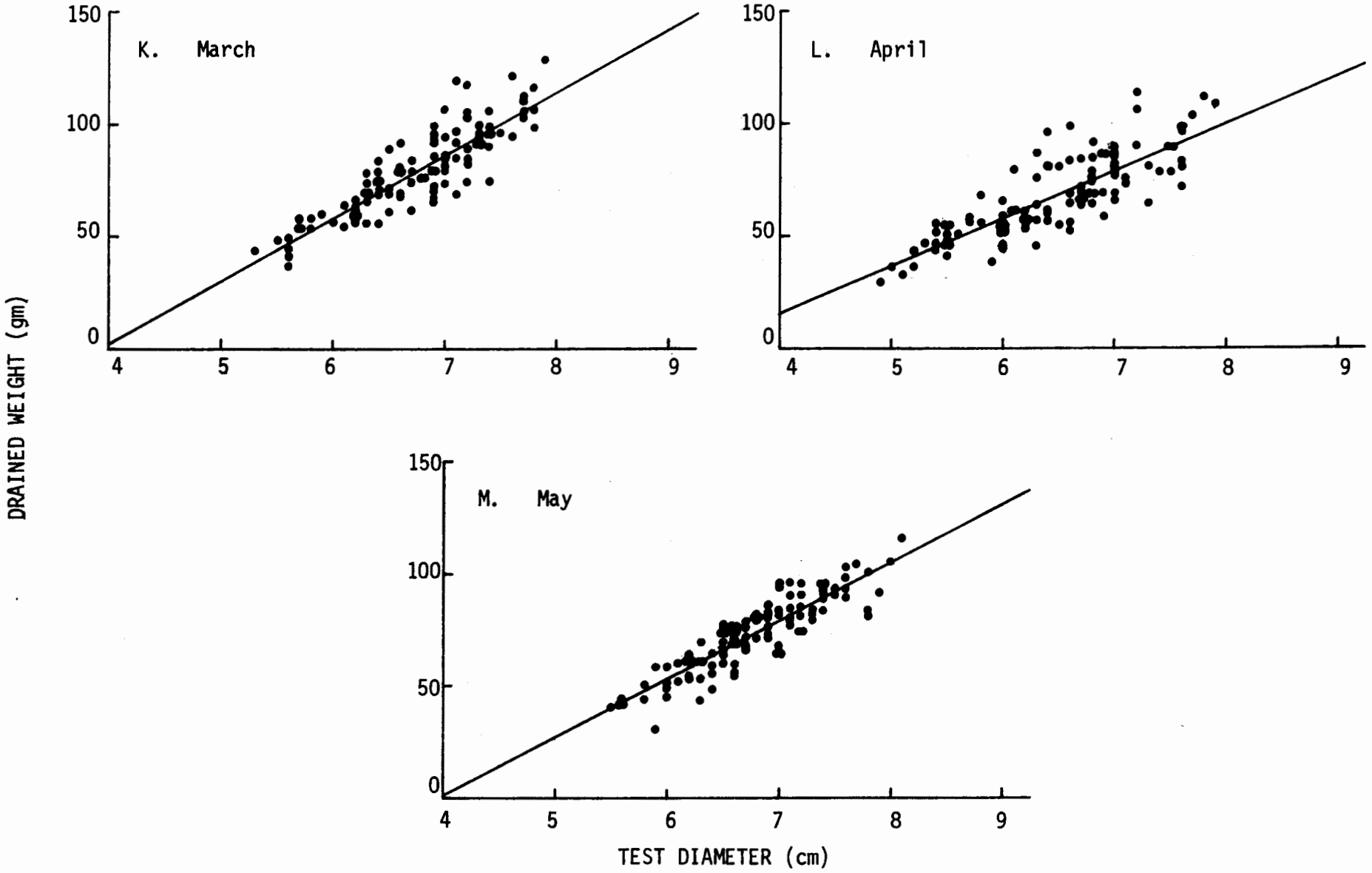

Fig. 2. (cont'd) - Test diameter versus drained weight for March - May 1976 (S. dröbachiensis)

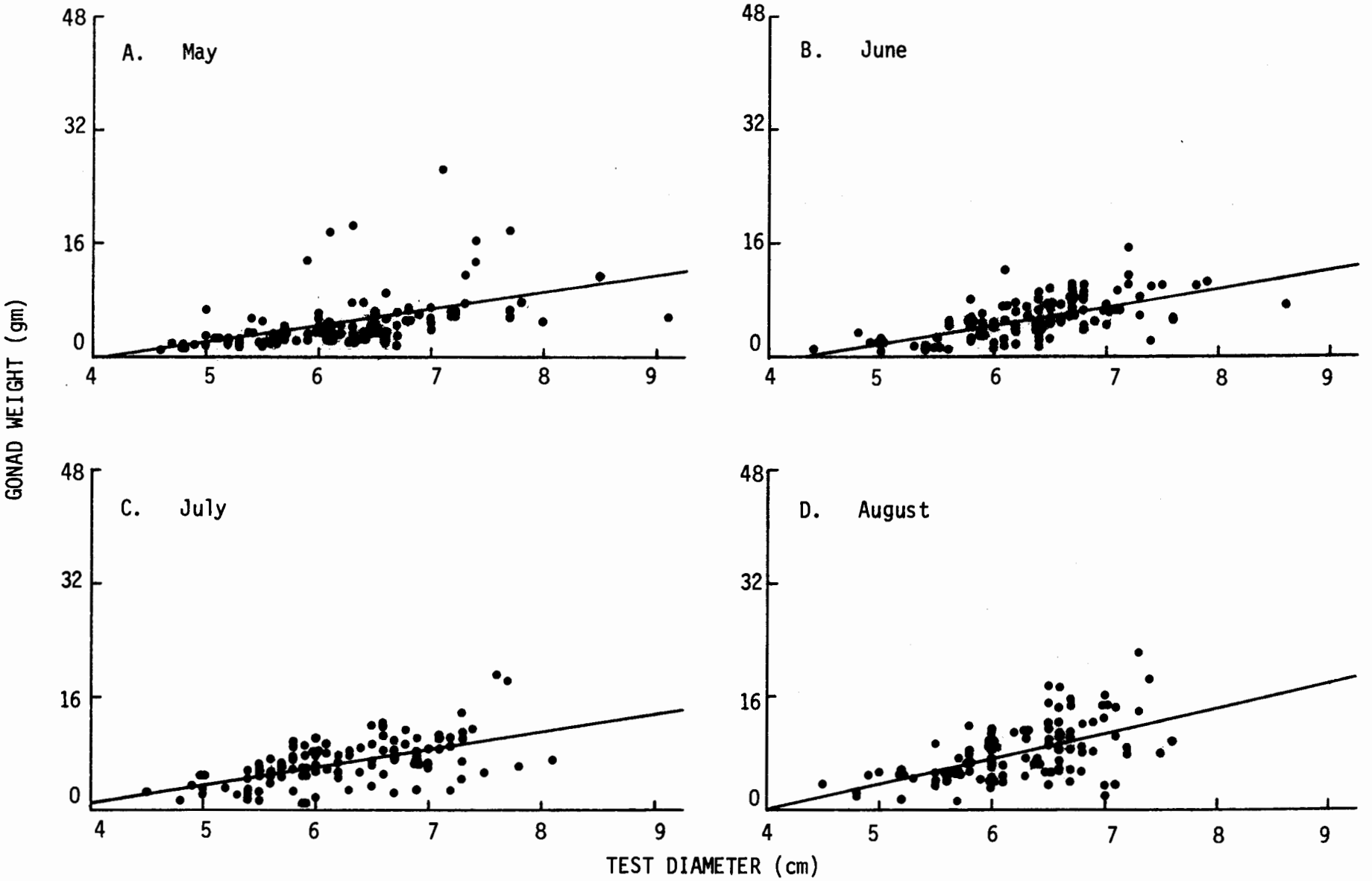

Fig. 3. Test diameter versus gonad weight for May - August 1975 (S. dröbachiensis)

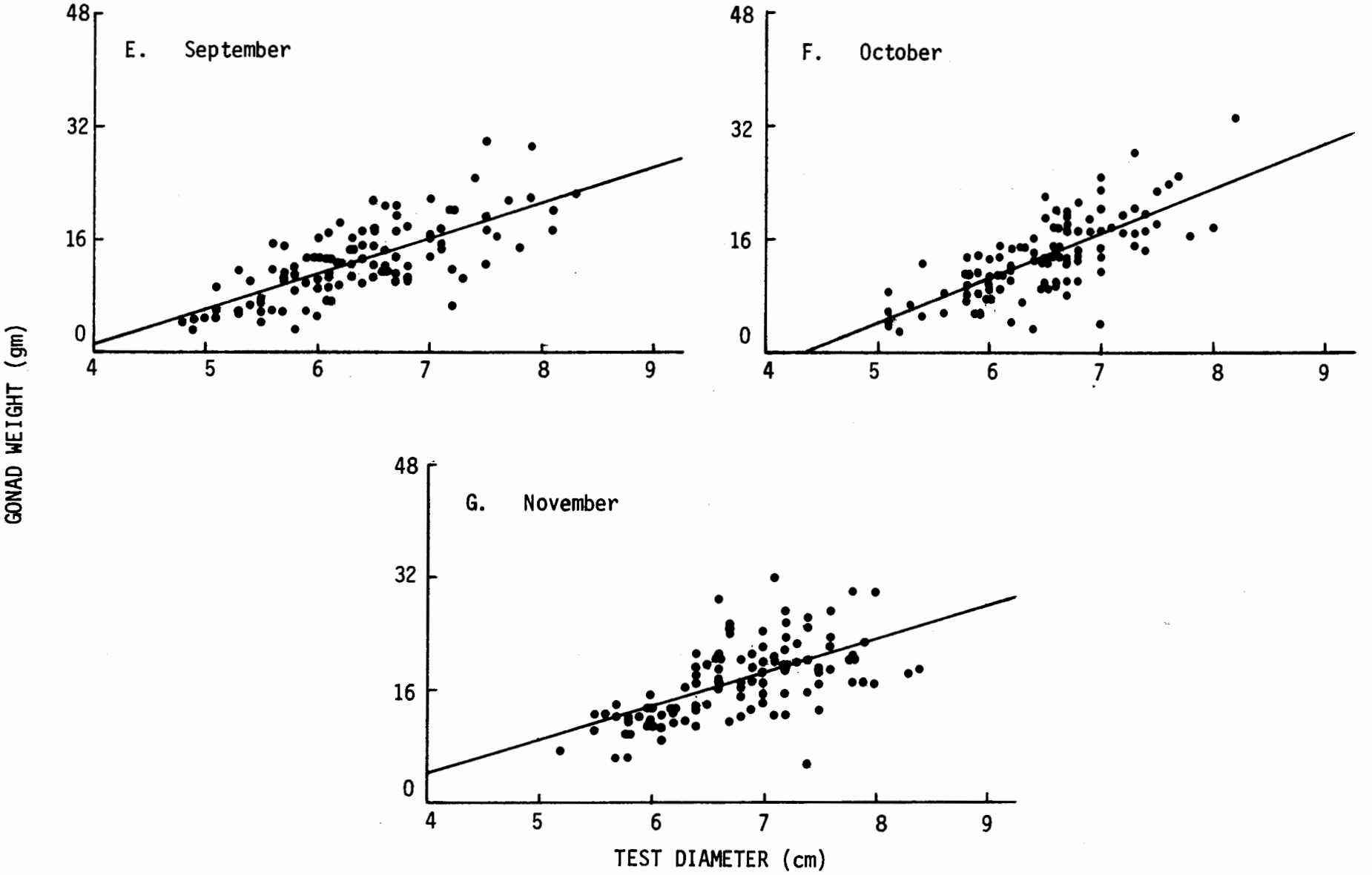

Fig. 3. (cont'd) - Test diameter versus gonad weight for September - November 1975 (S. dröbachiensis)

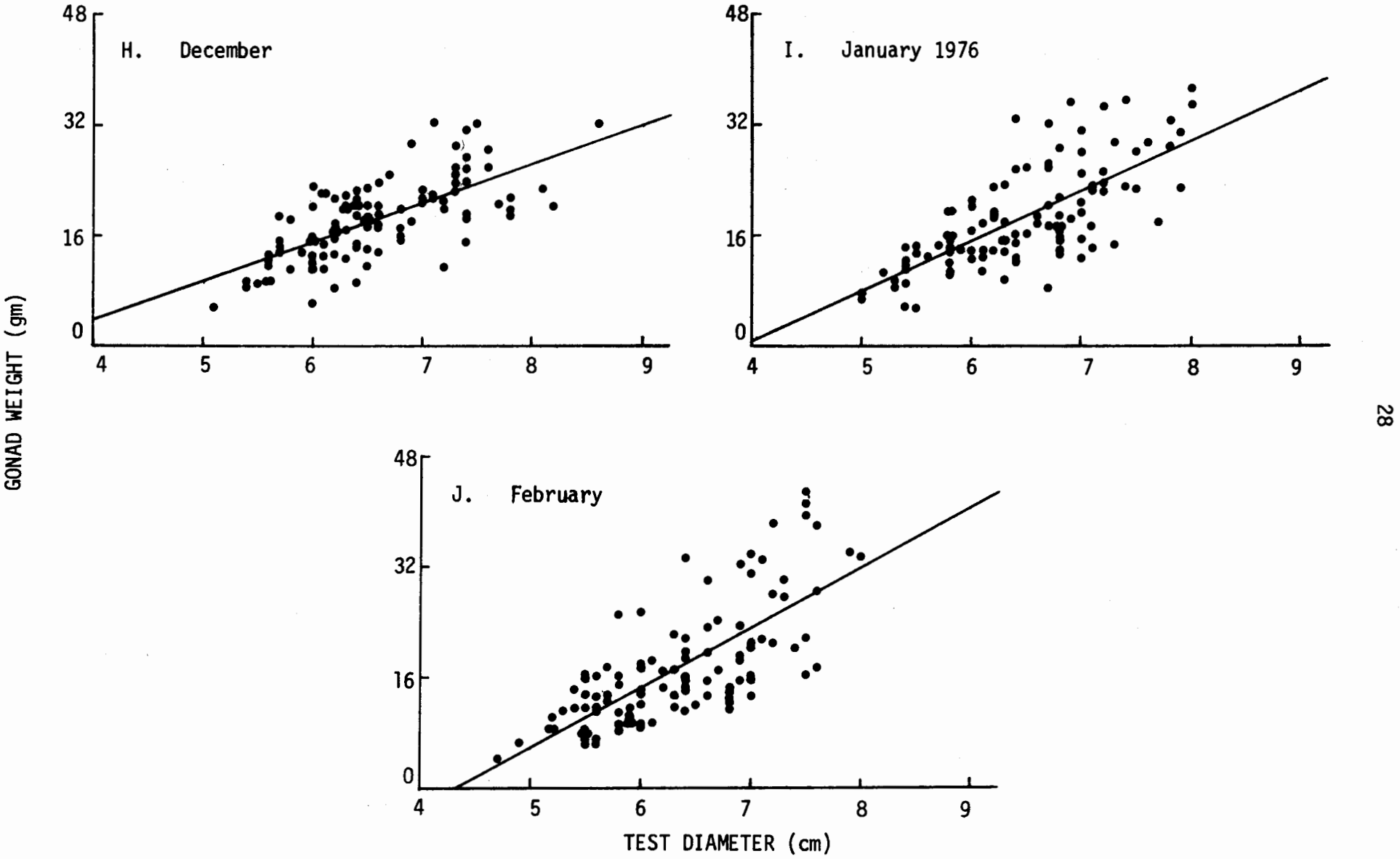

Fig. 3. (cont'd) - Test diameter versus gonad weight for December 1975 - February 1976 (S. dröbachiensis)

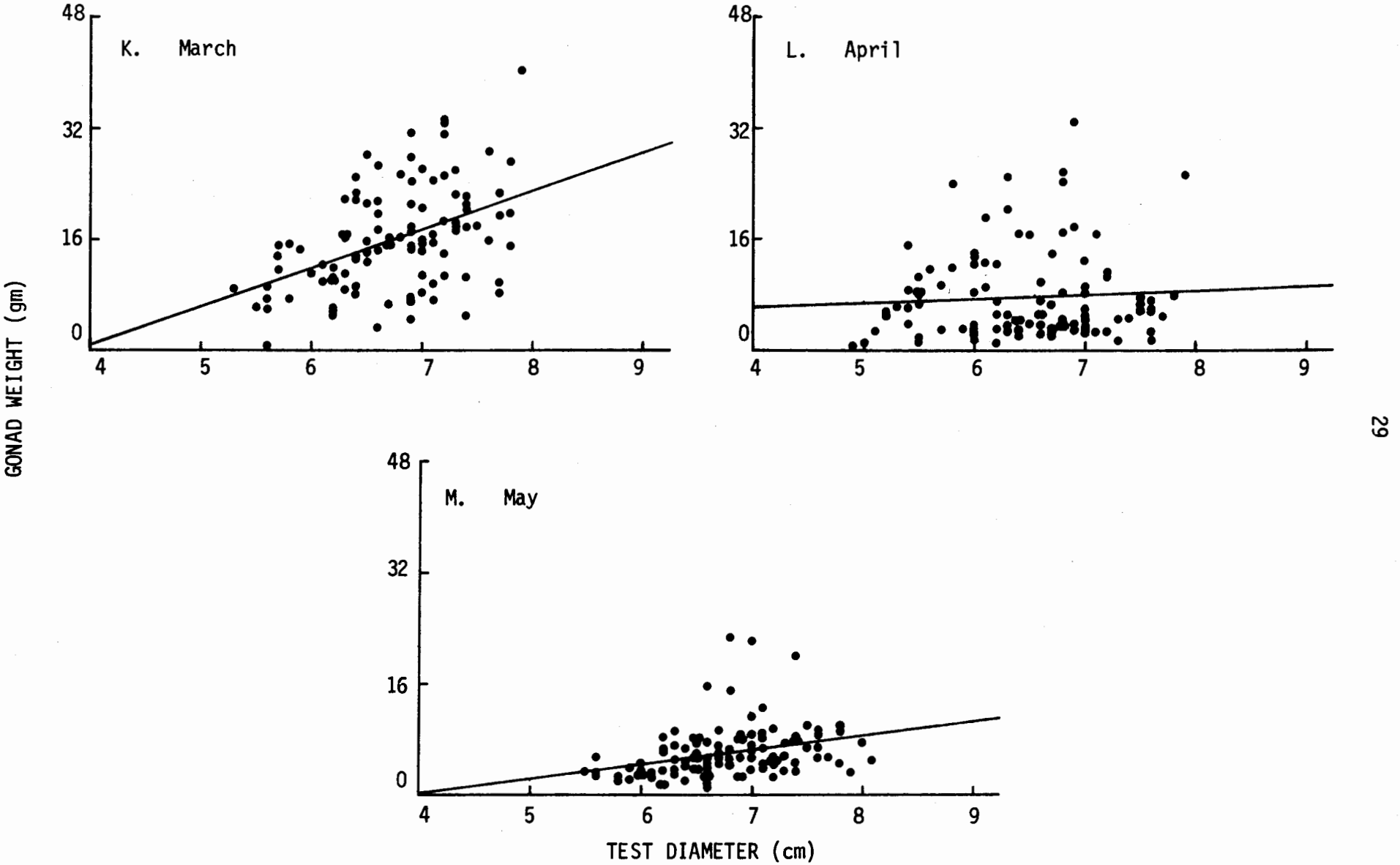

Fig. 3. (cont'd) - Test diameter versus gonad weight for March - May 1976 (S. dröbachiensis)

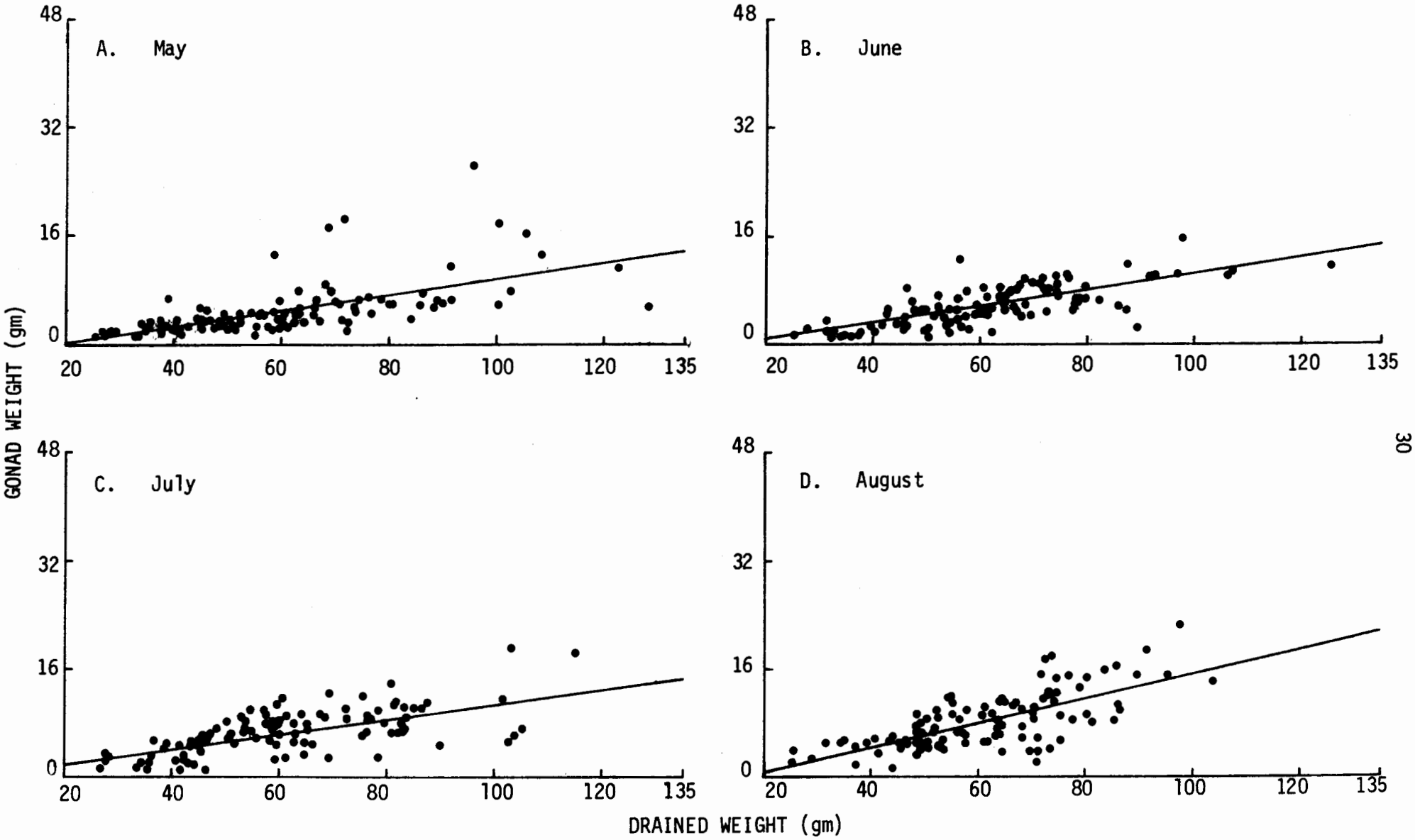

Fig. 4. Drained weight versus gonad weight for May - August 1975 (S. dröbachiensis)

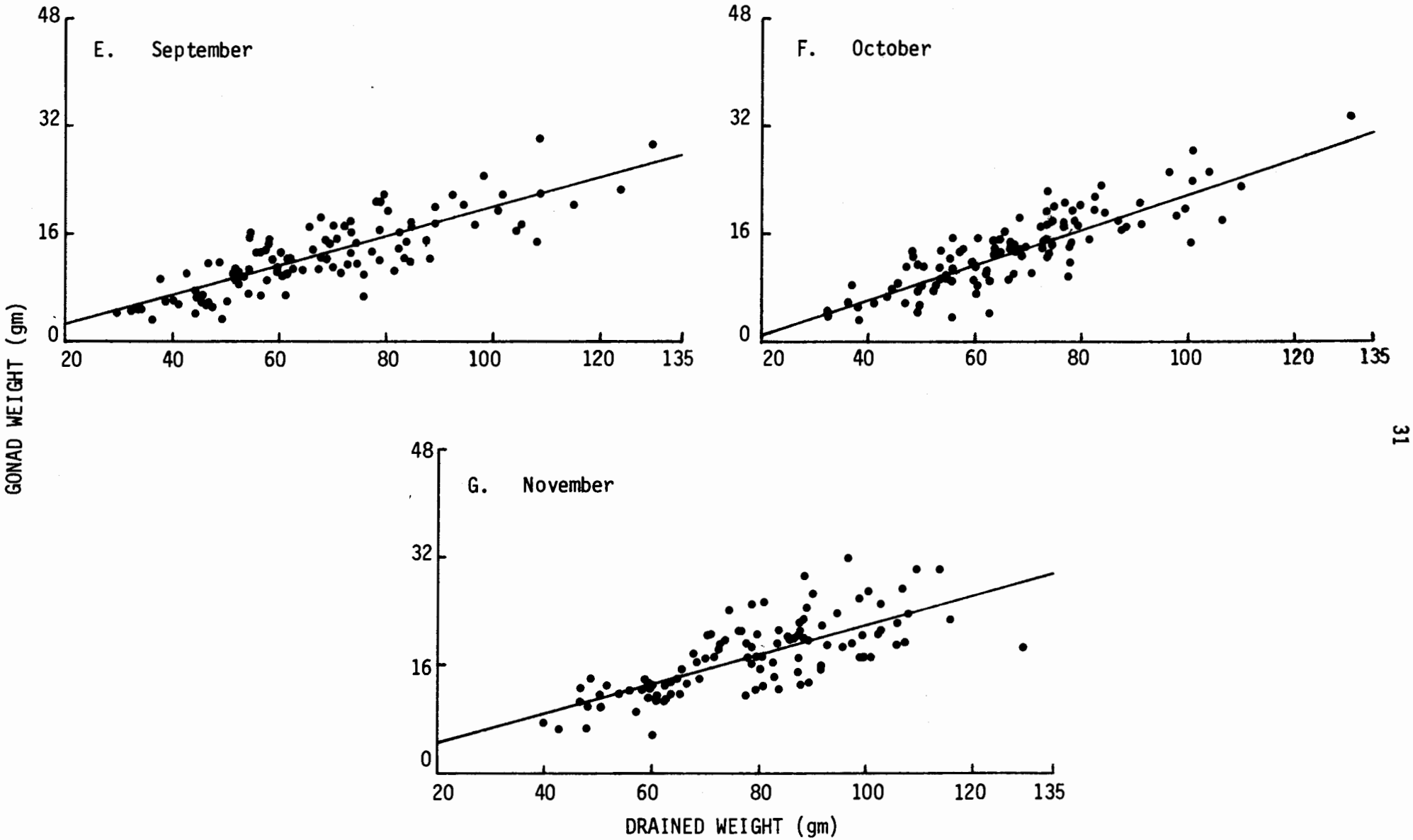

Fig. 4. (cont'd) - Drained weight versus gonad weight for September - November 1975 (S. dröbachiensis)

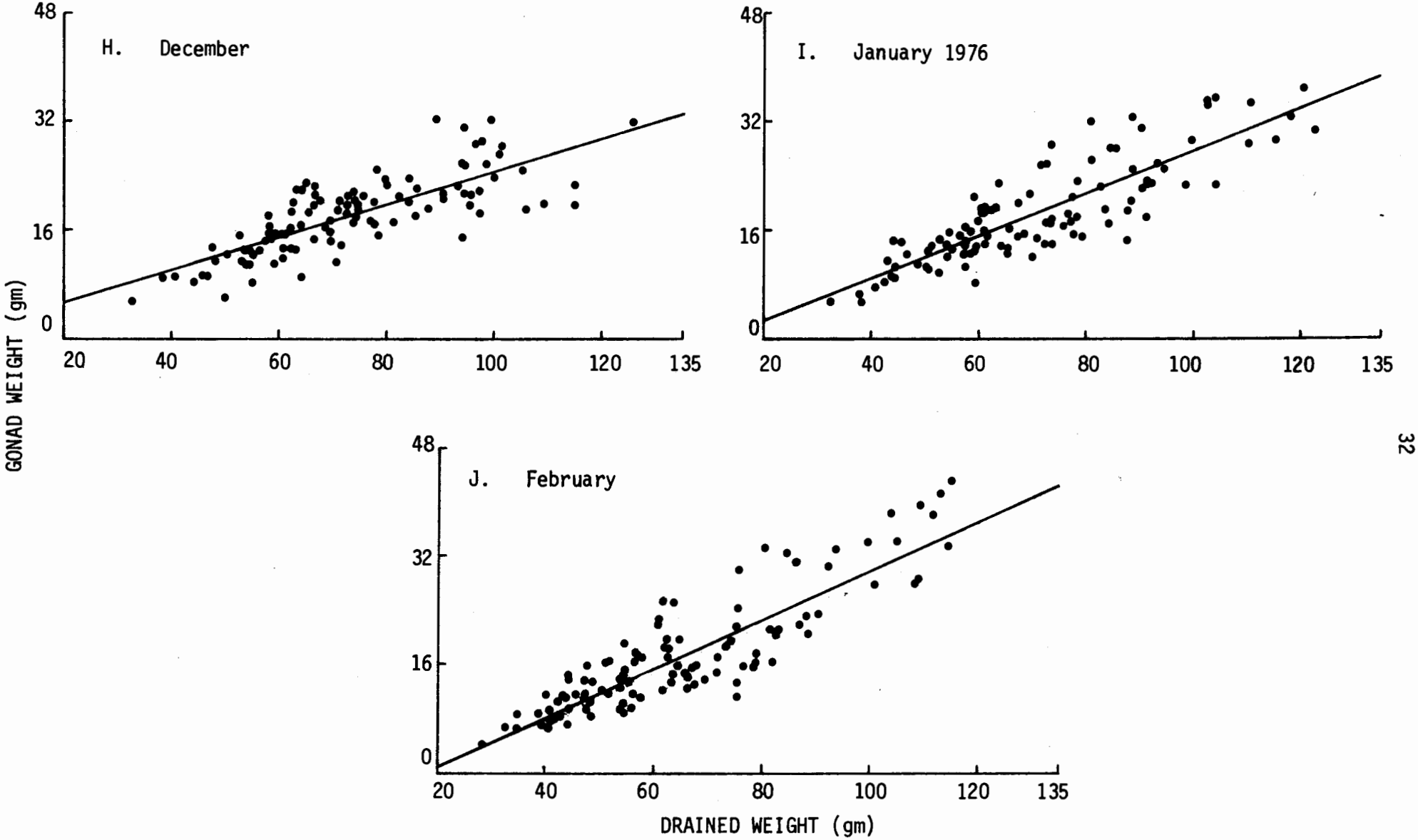

Fig. 4. (cont'd) - Drained weight versus gonad weight for December 1975 - February 1976 (S. dröbachiensis)

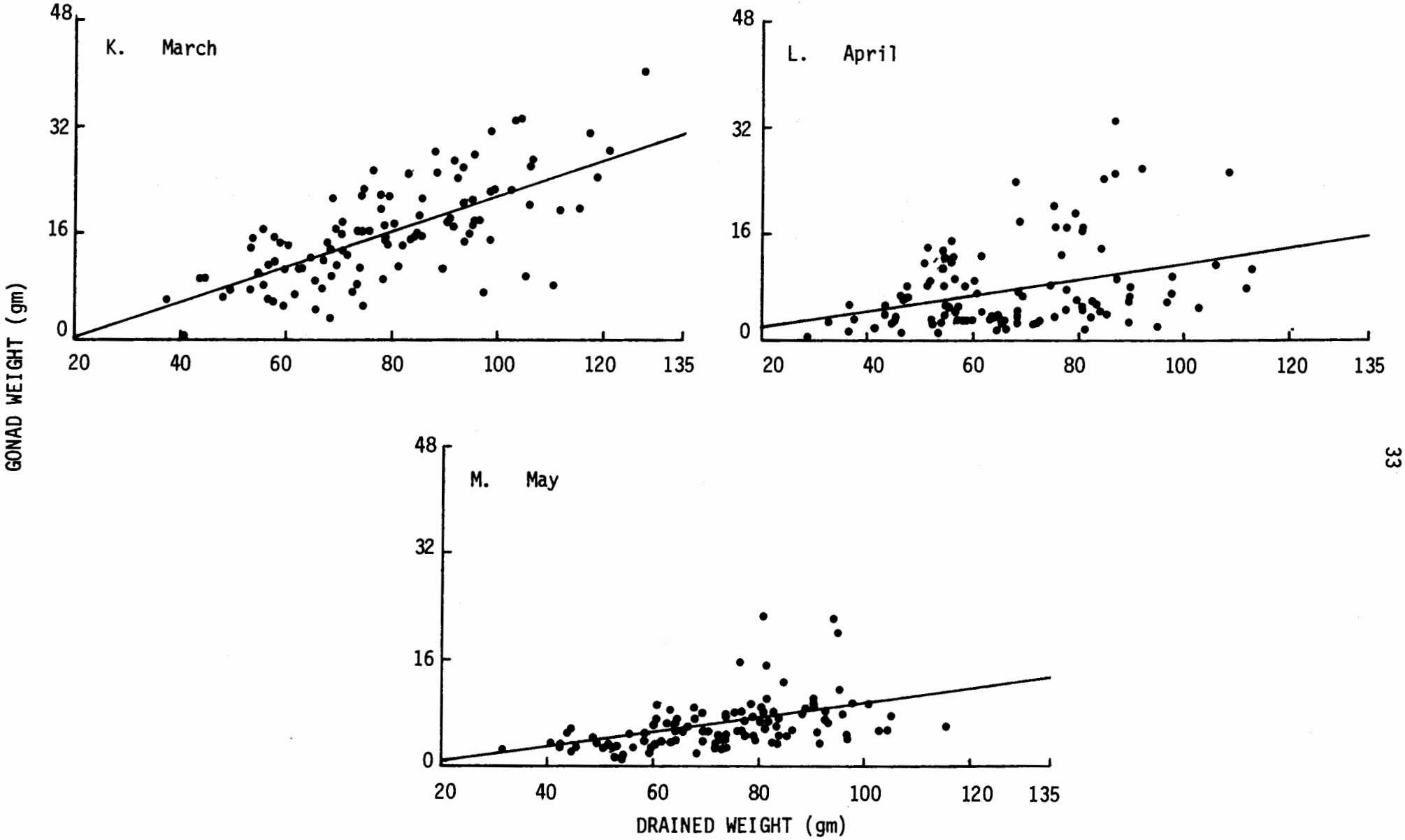

Fig. 4. (cont'd) - Drained weight versus gonad weight for March - May 1976 (S. dröbachiensis)

DISCUSSION

I. Morphometric relationships

Physical data on S. drōbachiensis from the Atlantic coast has been presented in several reports (Scattergood, 1947 and 1961; Fletcher, Pepper and Kean, 1974; Fletcher, Scaplen, Buggeln and Idler, 1974; Fletcher and Haggerty, 1975; Fowler and Fletcher, 1975).

Scattergood (1947 and 1961) sampled commercially harvested green sea urchins in Maine and found an average diameter of 1.8 inches with a range of 0.9 to 2.5 inches. This is slightly smaller than the average diameter of the urchins we collected. Fowler and Fletcher (1975) give population estimates at 11 locations and size-frequencey distributions at 2 locations along the coast of Newfoundland. Fletcher and Haggerty (1975) determined sea urchin density and size-frequency distributions for 4 locations on the coast of Labrador. They established age-growth curves for one Labrador and one Newfoundland location. Although their test diameter and test height data seem to indicate the sea urchins at these locations were quite small in comparison to the green urchins we collected, it should be noted that our urchins were purposely selected in the medium to large size range (the size we considered to be of commercial interest). In an extensive study on the biology of S. drōbachiensis, Fletcher, Pepper and Kean (1974) found that urchins in shallow water had gonads which were larger and of better quality (bright orange and firm) than those from deeper water. This is possibly due to the availability of more and/or better food. Vadas (1968) reported that natural populations of S. drōbachiensis on the Washington coast have heavier tests and gonads in areas where kelps other than Agarum spp. are dominant. The values given by Vadas for mean test diameter fall into the size range of our urchins. However his gonad weight values cannot be compared with our data since month of sampling is not given.

Using green urchins collected from 12 locations in southern Labrador, Fletcher, Scaplen, Buggeln and Idler (1974) determined size-frequency distributions. They found a linear relationship between test diameter and test height and their regression equations and correlation coefficients for

urchins gathered in September agree well with our data for September. The same plots for S. franciscanus (Kramer and Nordin, 1975) show slightly steeper slopes than data reported here for S. dröbachiensis. The correlation coefficients, however, are very similar.

For S. dröbachiensis, Fletcher, Pepper and Kean (1974) found the plot of test diameter versus weight gave a power curve. Our data indicates a linear relationship for this species with a slightly less steep slope than for S. franciscanus (Kramer and Nordin, 1975). We found very similar correlation coefficients for the two species.

For the test diameter versus gonad weight plot, Fletcher, Pepper and Kean (1974) found an exponential curve for S. dröbachiensis in more than 40 feet of water and a power curve for urchins at depths less than 40 feet. We obtained a linear relationship for this species with a less steep slope than for S. franciscanus (Kramer and Nordin, 1975) In this case, S. dröbachiensis had lower correlation coefficients than S. franciscanus.

Percent gonad has been shown to increase with body weight in S. dröbachiensis but levels off in larger urchins (Fletcher, Pepper and Kean, 1974). Their plot indicates that for urchins above 10 to 15 grams total body weight, percent gonad is independent of size of the urchin. The steep slope up to about 10 grams total body weight reflects the development of the gonad during growth of the urchin.

Miller and Mann (1973) report that the plot of wet weight versus gonad weight for S. dröbachiensis gives a power curve. They found better correlation in June and August than in October. We found a linear relationship between drained weight and gonad weight in S. dröbachiensis. Our results show better correlation for these parameters in the fall than in the summer. Our plots for S. dröbachiensis had very similar slopes to those we found for S. franciscanus, but had slightly lower correlation coefficients.

II. Gonadal yield and spawning

The changes in maturity throughout the year of S. drȍbachiensis on the Atlantic coast have been reported by Stephens (1972). In mid-December he found ripe eggs in 1/10 of the females. By January nearly half of the females were ripe. Maximum fertility was found during the period from mid-February to mid-April. Fertility was determined as percent fertilizable eggs by removal of eggs and sperm, followed by fertilization in sea water. Since ripeness in our study was estimated by visual inspection of the gonad (to determine the amount of white fluid containing sperm or yellow fluid containing eggs), it is difficult to compare our data with that of Stephens (1972). Maximum fertility in his study, however, does coincide with the month of maximum ripeness we found in females (February) and with our estimate of the spawning period. Harvey (1956) reported maximum ripeness in S. drȍbachiensis in March and April but did not indicate how this was determined. Stephens (1972) found males ripened several months earlier and were ripe longer than females; our conclusions agree with this finding.

Reported values for gonadal yield or index in S. drȍbachiensis at various times of the year (Scattergood, 1947 and 1961; Bedard, 1973; Fletcher, Pepper and Kean, 1974) are within the range of values we observed as given in the Appendix. The results of Fletcher, Pepper and Kean (1974), however, show somewhat smaller yields in March and April for green urchins from Logy Bay, Newfoundland than our mean values given in Table I. They also found gonads were largest in March or April while our highest gonad weights were found from December through February. Vadas (1968) has reported mean gonadal indices for S. drȍbachiensis fed on eight algal diets under laboratory conditions over a 15-month period. This data is not comparable with ours since only average values for the entire study period are given. Stephens (1972) found that gonadal index did not vary significantly from early January to mid-April under controlled laboratory conditions. Our results show a change from about 25% to 11% during this period for S. drȍbachiensis in the wild. We find that the period of little change in gonadal index for this species collected from Albert Head, B.C. occurs from mid-December to mid-February. Our increasing standard deviations show that variation in yield increases from urchin to urchin as spawning time approaches.

Only Fletcher, Pepper and Kean (1974) have reported changes in gonad index with time of year for S. dröbachiensis. A maximum of 18.8% was found for urchins gathered in April at a depth of 20 feet in Newfoundland. Urchins from deeper water peaked in yield in February or March. Our maximum gonadal yield was found in January and February, indicating a slightly earlier reproductive cycle in S. dröbachiensis from the Albert Head area.

For S. dröbachiensis on the east coast, spawning has been reported to occur from about mid-March to the end of April (Scattergood, 1947 and 1961; Harvey, 1956; Boolootian, 1966; Stephens, 1972; Bedard, 1973). In the Albert Head area S. dröbachiensis starts spawning about mid-March, continues through April and May and is spawned out by June. Differences in the reproductive cycle of echinoderms are due to influences by lunar cycle, food, salinity, light and temperature (Boolootian, 1966).

Several differences in gonad characteristics can be noted from a comparison of data for S. dröbachiensis and S. franciscanus, the species we studied previously (Kramer and Nordin, 1975). The gonadal yield shows higher standard deviations in green urchins than in the reds, indicating more variation from urchin to urchin. Gonadal yield peaked slightly later in S. dröbachiensis and showed a greater percentage increase from summer to winter than in S. franciscanus. Male green urchins had more yellow to brown "roe" while male S. franciscanus generally had orange "roe". "Roe" was also usually orange in color for female S. dröbachiensis compared to yellow in color for female S. franciscanus. S. dröbachiensis had slightly firmer "roe" than the larger red urchins. Spawning in S. dröbachiensis started and was completed slightly earlier than in S. franciscanus. Female urchins started spawning later than males for the green urchins but earlier than males for the reds.

III. Harvesting

In Maine, harvesting of S. dröbachiensis takes place from October to April with the bulk of the catch being made from December to March (Scattergood, 1947 and 1961).

Our data for S. dröbachiensis collected at Albert Head, B.C. shows gonad color is not dependent on time of year and consequently need not be considered in determining the best harvest season. The highest percentage of dark or dirty "roe" was found from April to July in males and from March to June in females, so these months should be avoided for harvesting. The "roe" was firmest from September to January.

If gonadal yield only is considered, September to March is the best period for harvesting. From January to March, however, the number of urchins with gonads which were not ripe fell from about 40% to 7% and a large percentage of the urchins with ripe gonads show the undesirable leakage of gametes during "roe" recovery and cleaning.

Our results indicate the period from September to January is the best for harvesting of S. dröbachiensis since this is the period with the lowest percentage of dark or dirty "roe", the firmest "roe", the highest gonadal yield and lowest incidence of ripe or degenerate samples.

ACKNOWLEDGEMENTS

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We would also like to thank A. Barnes and B. Mason for their help on field trips and in the laboratory the following day.

SUMMARY

1. The average total drained weights of S. dröbachiensis collected at Albert Head, B.C. were slightly lower during the summer months of 1975, then increased in the fall and remained fairly high during the winter of 1975-1976.

2. The average gonad weights and gonadal yields for S. dröbachiensis were highest from November to February. Winter values were more than three times the summer values. Females reached higher gonad weights and yields than males and the peaks occurred later for females than for males.

3. The "roe" from male and female S. dröbachiensis showed no seasonal color variations. Male gonads are light yellow to copper in color while female gonads are light yellow to yellow-orange.

4. "Roe" from both male and female S. dröbachiensis was firmest from September to January.

5. From May to August of 1975, S. dröbachiensis had completed spawning and gonad size was slowly increasing. The gonads started to ripen in the fall of 1975 in preparation for the next spawning season which started the following March. Degenerate gonads (indicating spawning had been completed) were found mainly in March, April and May.

6. Regression analyses for test diameter versus test height, test diameter versus drained weight, test diameter versus gonad weight and drained weight versus gonad weight indicate these relationships are linear for medium to large S. dröbachiensis. All linear regression formulas except those for test diameter versus gonad weight show good correlation and can be used for estimating one variable from the other.

7. The data for S. dröbachiensis collected at Albert Head, B.C. indicate this species should be harvested from September through January for the best gonadal yield and stage of maturity.

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APPENDIX

Monthly Physical Data for *S. dröbachiensis*

MAY 1975

Specimen No.	Sex	Test Diameter (cm)	Test Height (cm)	Drained Weight (gm)	Gonad Weight (gm)	Gonadal Yield (%)
1	M	7.4	4.2	105.5	16.4	15.5
2	F	6.7	3.7	76.7	4.6	5.9
3	M	8.5	4.2	122.8	11.4	9.3
4	F	7.2	3.3	89.0	6.6	7.4
5	F	6.2	3.3	52.4	3.3	6.3
6	F	7.0	3.7	73.7	4.8	6.5
7	F	7.3	4.0	86.2	7.6	8.8
8	M	6.8	3.4	66.5	6.7	10.1
9	F	6.8	3.5	63.1	4.4	7.0
10	F	6.3	3.1	52.3	4.2	7.9
11	F	6.0	3.2	66.1	5.3	8.0
12	F	6.0	3.4	55.9	4.1	7.3
13	F	6.2	2.8	54.3	4.6	8.4
14	F	6.7	3.5	74.5	6.4	8.5
15	F	6.1	3.1	56.6	4.3	7.6
16	M*	7.7	4.3	100.2	5.8	5.8
17	M*	5.2	2.5	34.9	1.9	5.5
18	F	5.5	3.0	41.3	1.6	3.8
19	M	5.4	2.9	40.5	3.5	8.6
20	F	7.7	3.7	100.4	17.9	17.8
21	F	5.7	3.1	46.8	3.4	7.2
22	M	5.5	2.8	46.2	5.1	11.0
23	M*	6.8	3.6	78.5	6.8	8.6
24	F	6.6	3.7	63.3	5.3	8.4
25	F	5.2	2.8	39.9	2.3	5.8
26	M	5.5	2.8	45.4	2.0	4.4
27	F	5.3	2.9	35.4	2.5	7.2
28	F	9.1	4.6	128.3	5.5	4.3
29	M*	6.4	3.4	69.2	7.8	11.3
30	F	6.1	3.3	62.4	3.2	5.1
31	M*	4.8	2.7	33.1	1.1	3.3
32	F	6.6	3.2	59.8	3.6	5.9
33	F	6.7	3.7	64.2	3.0	4.6
34	M*	5.6	3.4	42.9	2.5	5.7
35	F	6.1	2.9	60.5	4.4	7.3
36	F	5.7	3.0	49.3	4.2	8.6
37	F	6.1	3.4	51.0	2.5	4.9
38	M	6.5	3.6	70.7	5.9	8.4
39	M	5.4	3.0	44.9	5.3	11.8
40	F	6.5	3.2	62.8	4.2	6.7
41	M	6.0	3.3	59.8	6.3	10.6
42	M*	6.3	3.2	63.2	7.9	12.6
43	M	7.3	4.2	91.3	11.6	12.8
44	F	5.9	3.2	48.3	3.3	6.8
45	M*	5.3	2.6	32.8	1.4	4.1
46	F	6.5	3.4	66.0	4.3	6.5
47	F	7.8	3.9	102.7	7.8	7.6
48	M	6.5	3.5	59.9	3.6	6.0
49	M	7.7	3.7	91.7	6.6	7.2
50	F	4.7	2.7	28.2	1.8	6.3
51	F	7.0	3.7	88.5	5.5	6.2
52	F	7.1	3.6	95.8	26.4	27.6
53	F	7.4	4.0	108.4	13.3	12.3

MAY 1975 (Continued)

Specimen No.	Sex	Test Diameter (cm)	Test Height (cm)	Drained Weight (gm)	Gonad Weight (gm)	Gonadal Yield (%)
54	F	6.1	3.0	50.3	3.6	7.1
55	F*	6.0	3.0	44.8	3.6	8.2
56	F	5.0	2.4	34.0	3.1	9.1
57	M	5.5	2.8	50.4	1.9	3.8
58	F	4.8	2.2	27.1	1.2	4.3
59	F	6.5	3.4	71.3	3.7	5.2
60	M	6.9	3.6	80.7	6.0	7.4
61	F	5.6	3.0	45.8	3.3	7.1
62	F	6.4	3.4	67.0	3.6	5.4
63	M	5.0	3.0	38.7	6.7	17.3
64	F	7.0	4.1	84.3	3.9	4.6
65	M	6.1	3.0	68.8	17.4	25.2
66	M	5.9	3.1	58.7	13.4	22.8
67	M	7.0	3.8	76.3	7.2	9.5
68	F	6.3	3.4	71.8	18.5	25.7
69	F	6.5	3.4	56.4	4.5	8.0
70	M*	7.2	3.7	80.0	6.2	7.7
71	M	6.6	3.0	68.2	8.8	12.9
72	F	7.2	3.8	85.8	5.8	6.8
73	F	5.9	3.1	47.6	2.4	4.9
74	M	5.2	2.4	37.6	2.6	6.9
75	F	5.3	2.7	36.8	1.8	5.0
76	M	6.5	3.3	70.2	6.4	9.1
77	M	8.0	3.9	58.6	4.7	8.1
78	M	6.1	3.3	62.8	4.5	7.2
79	F	5.1	2.0	35.8	2.7	7.4
80	M	4.8	2.4	26.7	1.8	6.7
81	M*	5.0	2.9	37.6	1.6	4.3
82	F	5.8	3.2	59.8	2.3	3.8
83	M	6.8	3.4	73.7	5.2	7.1
84	M	5.7	3.1	44.5	3.6	8.2
85	F	5.7	2.9	48.9	2.5	5.2
86	M	6.6	3.8	72.2	2.1	2.9
87	M	5.1	2.8	38.8	2.8	7.3
88	M	6.1	2.8	49.0	2.8	5.7
89	F	7.2	3.8	90.0	6.2	6.9
90	F*	4.9	2.3	29.2	1.8	6.0
91	F	6.3	3.8	72.5	3.3	4.6
92	M	6.1	3.4	60.7	2.7	4.4
93	M*	6.7	3.6	55.2	1.4	2.6
94	F*	6.4	3.3	57.9	2.5	4.2
95	F	6.6	3.4	61.0	2.4	4.0
96	F*	6.4	3.5	55.4	2.6	4.8
97	M	5.4	3.0	37.5	3.5	9.3
98	F	5.6	3.1	40.4	2.4	6.0
99	M	6.0	3.2	52.2	3.7	7.0
100	M	6.3	3.3	58.3	2.1	3.6
101	F	6.3	3.8	51.6	2.1	4.1
102	F	4.6	2.4	25.3	1.0	4.0
103	F	5.6	2.7	41.1	2.1	5.2

* Sex was confirmed histologically.

JUNE 1975

Specimen No.	Sex	Test Diameter (cm)	Test Height (cm)	Drained Weight (gm)	Gonad Weight (gm)	Gonadal Yield (%)
1	M	7.0	3.6	78.2	6.9	8.8
2	M*	6.1	3.2	53.6	2.8	5.2
3	F*	7.6	3.9	87.2	5.1	5.8
4	F	7.2	3.5	96.8	10.3	10.6
5	M*	6.4	3.3	45.8	2.9	6.3
6	F*	6.2	3.5	45.8	1.8	3.8
7	M	6.1	3.3	56.0	12.2	21.7
8	F	7.4	4.2	92.5	10.1	11.0
9	F	5.8	2.6	52.1	4.5	8.7
10	M	6.8	3.5	74.0	10.1	13.7
11	F	6.2	3.0	63.8	6.4	10.1
12	F	6.4	3.6	62.1	5.0	8.0
13	F	5.5	2.6	41.9	2.8	6.6
14	F	6.7	3.4	77.7	5.9	7.6
15	F	7.0	3.8	78.2	6.3	8.1
16	F	5.6	2.7	42.9	4.9	11.5
17	F	6.7	3.4	71.0	8.7	12.3
18	F	7.3	4.3	79.6	8.5	10.7
19	M	7.1	3.5	78.3	6.8	8.7
20	M	7.8	4.0	105.9	10.1	9.5
21	F	6.4	3.4	60.5	4.4	7.2
22	F	6.2	3.1	57.2	4.0	7.1
23	F	6.2	3.1	57.3	7.8	13.5
24	F	7.0	3.6	72.3	7.6	10.5
25	M	6.5	3.3	64.5	4.8	7.5
26	M	6.8	3.6	67.2	8.6	12.8
27	F	6.3	3.4	64.3	5.9	9.1
28	M	6.4	3.1	60.4	4.4	7.3
29	M	7.2	3.9	97.5	15.7	16.1
30	F	5.8	3.0	52.1	5.6	10.7
31	F	7.9	4.3	107.0	10.8	10.1
32	M*	6.8	3.6	79.9	6.7	8.4
33	M	5.9	3.2	53.3	3.9	7.3
34	M	7.1	3.1	82.1	6.4	7.8
35	F	8.6	4.0	125.3	7.6	6.1
36	M	6.6	3.6	74.3	7.5	10.1
37	F	5.6	3.0	42.5	4.4	10.3
38	F	6.5	3.2	65.1	7.5	11.5
39	M	5.9	3.0	47.7	4.8	10.1
40	M	7.1	3.5	76.6	9.6	12.5
41	M	6.7	3.0	60.5	8.2	13.6
42	M	6.6	3.2	60.8	5.0	8.3
43	M	6.7	3.1	72.8	8.1	11.1
44	F	6.5	3.0	63.8	7.1	11.1
45	F*	7.6	3.8	85.6	5.6	6.5
46	M	5.8	2.7	46.3	2.7	5.9
47	M	5.8	3.1	49.3	4.8	9.8
48	M	6.4	3.2	59.2	4.2	7.1
49	F	6.1	2.9	54.2	5.2	9.6
50	F	6.7	3.2	71.7	9.7	13.6
51	M	6.7	3.5	74.6	7.1	9.6
52	F	6.2	3.5	61.3	4.3	7.1
53	M	6.6	3.1	66.2	5.6	8.5

JUNE 1975 (Continued)

Specimen No.	Sex	Test Diameter (cm)	Test Height (cm)	Drained Weight (gm)	Gonad Weight (gm)	Gonadal Yield (%)
54	M	7.0	3.8	66.9	4.7	7.0
55	M	6.5	3.3	68.2	9.7	14.2
56	M	7.3	3.6	59.4	5.9	9.9
57	M	6.7	3.4	76.3	10.4	13.6
58	M	6.8	3.7	67.6	4.0	5.9
59	F	4.9	2.2	27.8	2.1	7.7
60	F	6.7	3.0	66.8	8.0	12.0
61	M	6.0	3.0	55.4	4.8	8.7
62	M	6.3	3.3	64.8	7.3	11.2
63	M	7.4	3.5	89.1	2.4	2.7
64	F	5.8	3.2	46.1	8.1	17.6
65	F	7.2	3.4	87.5	11.7	13.4
66	F	6.4	2.9	55.8	6.9	12.4
67	M	5.9	2.7	47.2	6.2	13.1
68	M*	5.6	3.1	34.0	1.0	3.1
69	M	6.9	3.5	77.0	5.1	6.6
70	M	6.8	3.3	74.4	8.8	11.8
71	M	5.9	3.1	54.4	3.3	6.1
72	F	6.2	3.2	55.9	3.7	6.6
73	M*	6.0	2.8	51.2	4.2	8.3
74	M	4.8	2.6	31.2	3.5	11.3
75	M	5.9	2.6	44.3	3.2	7.1
76	F	6.4	3.4	63.7	8.2	12.9
77	F	6.1	2.9	52.0	7.3	14.0
78	F	5.0	2.7	31.4	1.9	6.2
79	M	5.8	3.0	49.9	5.1	10.3
80	M	7.5	4.0	91.6	10.2	11.2
81	M	6.5	3.4	65.8	7.9	12.0
82	F	6.4	3.6	46.0	4.0	8.7
83	M	6.8	3.2	71.9	8.1	11.2
84	F	5.5	2.4	34.8	1.2	3.3
85	F	6.1	3.1	61.2	7.1	11.7
86	M*	5.3	2.5	37.5	1.6	4.2
87	M	6.5	3.4	72.3	4.7	6.5
88	F*	6.8	3.5	69.4	4.4	6.3
89	M	5.0	2.6	39.8	2.7	6.8
90	F	5.8	3.0	50.3	2.3	4.6
91	M	6.0	3.1	50.1	1.2	2.4
92	F	6.7	3.8	68.1	5.9	8.7
93	M	6.5	3.3	56.4	2.6	4.5
94	F	6.4	3.3	57.8	2.2	3.8
95	M	6.1	3.3	54.2	1.7	3.1
96	M	6.4	3.1	69.8	9.2	13.2
97	M	6.4	3.1	62.2	1.6	2.6
98	F	5.0	2.6	32.6	2.1	6.3
99	F*	5.5	2.8	37.1	1.3	3.4
100	M	5.4	3.0	40.2	1.7	4.2
101	F*	4.4	2.3	25.1	1.1	4.3
102	M	5.0	2.6	32.4	0.7	2.3
103	F*	6.0	3.0	49.6	2.0	4.0
104	F	5.4	2.9	35.8	0.9	2.6

* Sex was confirmed histologically.

JULY 1975

Specimen No.	Sex	Test Diameter (cm)	Test Height (cm)	Drained Weight (gm)	Gonad Weight (gm)	Gonadal Yield (%)
1	F	8.1	4.5	105.2	7.3	6.9
2	M	6.7	3.4	65.4	7.2	11.0
3	F	5.9	3.0	50.5	5.9	11.8
4	M	6.9	3.7	82.1	6.6	8.0
5	M*	6.6	3.4	66.4	4.9	7.4
6	M*	7.6	4.1	103.1	19.2	18.7
7	F	5.9	3.2	51.9	4.7	9.1
8	F	6.4	3.5	68.3	8.7	12.7
9	F	6.9	3.6	82.7	7.8	9.5
10	M*	6.2	3.6	59.6	4.6	7.7
11	M*	7.0	4.0	83.8	8.6	10.3
12	F	7.1	3.9	86.5	10.2	11.8
13	M	6.3	3.2	61.2	2.8	4.6
14	F	5.9	3.0	58.8	7.9	13.4
15	F	7.3	3.6	83.0	6.8	8.1
16	M*	6.4	3.5	64.8	5.3	8.2
17	M*	6.2	3.2	65.2	7.8	12.0
18	F	7.4	3.8	101.8	11.5	11.3
19	M	7.5	4.0	102.7	5.2	5.1
20	F*	7.2	3.6	78.4	2.8	3.6
21	F	6.6	3.4	60.7	12.0	19.7
22	F	7.2	3.6	76.4	8.8	11.4
23	F	6.5	3.4	64.9	3.4	5.2
24	M	5.7	3.1	51.0	6.3	12.3
25	F	6.5	3.3	63.0	6.4	10.2
26	F*	7.3	3.9	89.9	4.4	4.9
27	M	5.4	2.8	42.2	3.0	7.2
28	F	7.8	4.1	103.8	6.1	5.8
29	M*	6.9	3.9	76.2	6.6	8.6
30	M	6.0	3.2	58.0	7.9	13.6
31	F	6.6	3.3	76.9	8.4	10.9
32	F	6.5	3.2	64.0	9.3	14.5
33	F	5.9	2.8	45.6	6.0	13.0
34	M	6.6	3.3	59.8	10.8	18.1
35	F	6.5	3.1	58.8	7.0	11.8
36	F	7.3	3.9	87.5	11.1	12.7
37	M	6.7	3.2	58.0	7.8	13.4
38	F	7.1	3.7	81.3	10.8	13.3
39	F	5.2	2.6	28.1	3.3	11.7
40	F	6.9	3.9	72.3	10.2	14.1
41	M*	5.6	3.3	53.6	7.4	13.8
42	M*	7.3	3.6	85.0	10.1	11.8
43	F	5.9	2.9	44.1	4.7	10.6
44	F	5.4	2.6	36.8	5.6	15.3
45	F	6.6	3.4	69.1	12.3	17.7
46	F	7.1	3.4	72.7	8.6	11.9
47	F	6.0	3.2	53.9	8.3	15.4
48	M	6.9	3.4	83.1	7.2	8.7
49	F	7.3	3.6	80.8	13.8	17.1
50	M	6.0	3.2	50.2	8.1	16.1
51	F	6.1	3.2	57.5	9.2	15.9
52	F	5.8	3.0	57.2	9.7	17.0
53	M	5.9	3.3	41.7	1.0	2.5

JULY 1975 (Continued)

Specimen No.	Sex	Test Diameter (cm)	Test Height (cm)	Drained Weight (gm)	Gonad Weight (gm)	Gonadal Yield (%)
54	F	6.3	3.4	60.0	8.3	13.9
55	M*	6.8	3.9	81.8	11.4	13.9
56	M	6.3	3.4	59.8	7.8	13.0
57	F	6.8	3.3	67.8	9.1	13.4
58	F	7.2	3.3	83.1	10.4	12.5
59	F*	5.4	2.8	33.5	1.5	4.5
60	M	5.3	2.7	35.8	2.2	6.2
61	M	6.1	3.1	55.8	5.7	10.2
62	M	6.2	3.2	62.6	5.2	8.4
63	F	5.6	2.7	45.5	5.6	12.4
64	F	5.5	2.9	46.9	6.0	12.7
65	M	5.0	2.7	34.1	2.2	6.4
66	F	6.2	3.0	54.9	6.8	12.4
67	M	5.8	2.9	45.8	5.7	12.5
68	F	6.5	3.7	75.4	12.0	15.9
69	M	6.1	3.1	62.6	8.0	12.8
70	F	6.7	3.6	76.4	8.4	11.0
71	F	5.7	3.0	53.4	6.8	12.7
72	M	6.7	3.8	78.5	9.9	12.6
73	F	5.5	2.8	43.9	5.0	11.3
74	M	7.0	3.7	75.3	6.2	8.3
75	F	7.7	4.1	115.1	18.3	15.9
76	F*	6.0	3.1	44.2	1.8	4.1
77	M	6.7	3.2	59.2	2.5	4.2
78	F	5.6	2.9	43.6	4.7	10.9
79	F	6.0	3.0	54.7	10.2	18.6
80	F	6.0	3.4	58.3	5.6	9.6
81	M	5.8	3.0	53.0	8.7	16.4
82	M	5.7	2.9	44.5	4.6	10.4
83	M	5.5	3.0	35.5	1.2	3.4
84	F	5.5	2.7	40.8	2.5	6.2
85	F	4.8	2.4	26.8	1.3	4.9
86	F	5.5	2.8	47.2	6.3	13.4
87	M	5.4	3.0	43.0	2.2	5.2
88	M	6.9	3.7	79.8	8.0	10.1
89	M	6.9	3.5	69.1	3.1	4.5
90	F*	6.0	3.1	60.0	6.4	10.6
91	F	5.6	2.8	45.5	3.8	8.4
92	M	5.4	2.6	38.6	4.3	11.1
93	F	5.9	3.1	61.4	9.1	14.8
94	M	5.5	2.9	46.3	5.5	11.9
95	M	7.0	3.4	80.6	6.5	8.0
96	F	5.8	2.9	59.0	7.7	13.0
97	F	4.5	2.4	27.8	2.5	9.1
98	F	4.9	2.3	27.6	3.7	13.3
99	M	5.8	2.6	42.3	2.8	6.5
100	M	5.0	2.6	36.1	3.2	8.9
101	F	5.0	2.8	41.6	4.7	11.2
102	M	5.9	3.4	46.4	1.0	2.0
103	M	5.8	2.9	48.4	7.3	15.1
104	F	5.0	2.6	39.0	4.8	12.4

* Sex was confirmed histologically.

AUGUST 1975

Specimen No.	Sex	Test Diameter (cm)	Test Height (cm)	Drained Weight (gm)	Gonad Weight (gm)	Gonadal Yield (%)
1	M*	6.6	3.0	63.8	7.0	11.0
2	F	6.0	3.0	53.0	4.2	8.0
3	M	6.7	3.3	68.4	5.8	8.5
4	F	6.7	3.5	74.3	11.3	15.2
5	F	4.8	2.5	29.0	2.5	8.6
6	F	6.6	3.4	71.3	5.7	7.9
7	M*	5.7	3.0	48.5	7.6	15.6
8	F	7.2	3.2	80.2	8.9	11.0
9	F	6.4	3.0	64.1	6.3	9.8
10	M	6.0	3.0	48.6	3.4	6.9
11	F	5.8	3.0	49.4	6.5	13.2
12	M	6.8	3.6	75.4	8.9	11.8
13	M	6.5	2.9	61,3	5.2	8.5
14	M	6.7	3.6	73.4	4.0	5.4
15	M*	5.8	2.6	49.4	8.0	16.3
16	F	6.9	3.6	77.7	8.3	10.7
17	M*	7.0	3.6	85.8	16.3	19.0
18	F	5.5	2.8	48.6	9.3	19.1
19	F	7.3	4.1	97.8	22.4	22.8
20	M	7.0	3.6	69.8	3.7	5.3
21	M	6.8	3.5	73.4	12.1	16.5
22	M	7.0	3.6	89.9	14.9	16.6
23	F	4.5	2.5	25.6	3.9	15.2
24	M	6.8	3.4	75.5	5.4	7.2
25	F	7.2	3.4	81.3	8.0	9.9
26	M	6.7	3.4	70.3	8.5	12.0
27	F	6.0	2.8	48.9	6.7	13.7
28	M	6.5	3.2	72.7	17.3	23.7
29	F	5.8	3.0	55.0	12.0	21.7
30	M	5.7	2.9	44.0	5.8	13.1
31	M	7.1	3.3	71.2	3.8	5.3
32	M	6.7	3.3	77.0	15.0	19.5
33	M	7.1	3.9	86.1	10.6	12.3
34	M	7.4	3.5	91.4	18.6	20.3
35	F	6.0	3.1	52.7	8.6	16.3
36	M	7.6	3.5	86.5	9.9	11.4
37	F*	5.6	2.9	46.9	4.7	10.0
38	M	6.6	3.5	74.9	14.6	19.5
39	M	6.0	2.8	58.0	9.8	16.8
40	M	6.7	3.3	70.6	10.4	14.7
41	F	5.2	3.0	40.7	5.7	13.9
42	M	7.0	3.3	79.0	13.1	16.6
43	F*	6.6	3.2	56.7	8.4	14.7
44	F	6.7	3.3	83.8	15.9	18.9
45	F	6.3	3.2	57.6	4.8	8.3
46	F	6.5	3.8	73.3	12.4	16.9
47	F*	5.7	3.2	53.5	5.5	10.3
48	M	6.8	3.2	63.9	8.2	12.8
49	F	6.0	2.8	52.4	9.6	18.2
50	F	6.6	3.3	66.9	10.5	15.7
51	M*	5.5	2.9	41.3	3.5	8.4
52	F*	5.8	3.0	51.8	6.9	13.3
53	M*	6.0	3.1	57.8	6.2	10.8

AUGUST 1975 (Continued)

Specimen No.	Sex	Test Diameter (cm)	Test Height (cm)	Drained Weight (gm)	Gonad Weight (gm)	Gonadal Yield (%)
54	M	6.0	2.8	54.6	11.7	21.3
55	M	6.0	3.1	53.6	4.0	7.5
56	F	5.2	2.5	34.6	5.2	15.1
57	M	5.7	2.9	44.0	1.4	3.3
58	F	6.1	3.1	49.1	4.0	8.1
59	F	5.2	2.8	37.4	1.6	4.4
60	F	6.6	3.2	67.1	11.1	16.6
61	F	5.5	3.0	45.8	4.2	9.3
62	F	6.6	3.7	74.9	12.4	16.6
63	M	5.8	3.0	50.2	8.5	17.0
64	M	6.6	3.4	73.9	17.7	23.9
65	F	6.0	3.4	52.7	4.6	8.7
66	F	5.6	2.9	50.5	5.0	9.8
67	F	5.5	2.8	43.4	5.4	12.6
68	F*	4.8	2.5	25.4	2.2	8.5
69	M	6.6	3.3	63.4	6.0	9.4
70	M	6.2	3.2	64.6	11.3	17.5
71	M	7.5	3.6	85.3	8.1	9.5
72	M	6.5	3.6	68.2	10.1	14.8
73	F	5.6	3.0	50.5	4.4	8.7
74	F	5.2	2.7	39.4	5.0	12.7
75	M*	6.5	3.3	64.5	3.8	6.0
76	M*	6.5	3.4	61.7	5.4	8.7
77	M	5.6	3.0	49.2	5.0	10.1
78	F	6.4	3.4	64.6	7.5	11.7
79	F	6.0	3.2	62.9	9.4	14.9
80	F	6.3	3.1	61.2	10.3	16.9
81	F*	7.0	3.8	71.0	2.1	2.9
82	M	6.1	3.1	57.5	6.3	11.0
83	M	5.8	3.0	46.5	5.5	11.9
84	F	4.9	2.4	31.8	4.8	15.0
85	F	6.0	3.2	55.1	9.2	16.7
86	F	5.0	2.6	35.0	5.5	15.7
87	F	6.9	3.4	73.1	12.6	17.2
88	F	6.5	3.4	72.2	11.5	16.0
89	M	6.5	3.0	71.9	15.3	21.3
90	M	5.9	3.2	50.2	4.3	8.5
91	M	6.3	3.2	64.5	11.5	17.8
92	F	5.7	2.9	45.4	4.9	10.8
93	F*	6.0	3.4	52.0	7.3	14.1
94	F	7.3	4.0	103.9	14.0	13.4
95	F	6.3	3.4	68.1	7.5	11.0
96	M	6.4	3.4	56.2	6.6	11.7
97	F	6.3	2.7	64.6	11.3	17.5
98	F	7.1	3.8	80.4	14.5	18.0
99	M*	5.3	3.0	37.3	4.5	12.0
100	F	6.0	3.0	55.3	10.9	19.7
101	M	6.0	3.2	60.7	9.2	15.2
102	F	7.0	3.8	95.2	15.0	15.8
103	F	6.5	3.4	70.1	9.2	13.1
104	F	6.1	3.3	48.6	4.8	10.0

* Sex was confirmed histologically.

SEPTEMBER 1975

Specimen No.	Sex	Test Diameter (cm)	Test Height (cm)	Drained Weight (gm)	Gonad Weight (gm)	Gonadal Yield (%)
1	F	5.7	2.6	58.0	15.1	26.0
2	F	5.9	2.8	55.6	13.3	23.9
3	M	6.5	3.4	70.0	17.2	24.5
4	F	6.3	3.4	73.3	16.0	21.8
5	F	6.3	3.2	69.3	14.8	21.4
6	M	6.0	3.0	54.5	16.0	29.4
7	F	7.9	4.1	129.5	29.2	22.5
8	F*	7.5	4.0	96.7	17.1	17.7
9	M	7.0	4.1	92.2	21.8	23.6
10	F	8.3	4.5	123.8	22.5	18.2
11	F	7.2	3.6	89.0	20.0	22.5
12	M	6.1	3.1	59.7	11.1	18.7
13	F	7.4	3.6	98.2	24.6	25.0
14	M	6.8	3.3	71.7	10.2	14.2
15	M	6.6	3.3	78.5	20.7	26.4
16	F	6.0	3.2	66.2	13.6	20.6
17	F	7.7	4.0	101.7	21.7	21.4
18	M*	5.6	3.0	54.3	15.4	28.3
19	M	6.1	3.5	65.5	16.7	25.6
20	M	5.3	3.1	46.8	11.6	24.7
21	F	6.6	3.4	74.7	11.5	15.4
22	F	7.6	4.0	104.3	16.3	15.6
23	F	6.8	3.5	73.1	17.8	24.3
24	M	6.4	3.3	72.0	17.1	23.8
25	F	7.9	4.0	108.9	21.9	20.1
26	F	6.0	3.2	47.3	5.1	10.8
27	M	6.7	3.3	78.3	20.7	26.4
28	F	6.2	3.0	60.5	9.7	16.0
29	M*	7.2	3.7	75.8	6.5	8.5
30	F	7.5	3.9	108.6	30.0	27.6
31	F	5.8	3.0	58.8	12.0	20.4
32	M	6.2	3.2	67.8	18.3	27.0
33	F	6.7	3.9	84.9	16.9	19.9
34	F	4.9	2.6	32.2	4.5	13.9
35	F	5.5	2.9	45.8	7.0	15.3
36	M*	6.7	3.6	70.0	11.1	15.8
37	M	6.5	3.5	79.7	21.6	27.2
38	F	6.4	3.6	73.1	13.1	17.9
39	F	7.5	4.1	83.1	12.2	14.7
40	F	7.2	3.6	84.6	11.8	13.9
41	F	6.0	3.0	51.9	9.0	17.4
42	F	7.1	3.8	83.8	14.8	17.7
43	F	7.1	3.6	89.0	17.6	19.8
44	F	6.1	3.2	54.4	7.2	13.3
45	M	6.4	3.2	61.1	9.8	16.0
46	M*	5.6	2.8	45.4	5.9	13.1
47	F	6.0	3.1	59.5	10.3	17.3
48	M	7.1	3.6	87.4	15.1	17.3
49	M	5.8	2.9	49.4	3.3	6.6
50	F	5.8	3.2	52.4	8.5	16.2
51	F	6.6	3.4	72.9	11.5	15.8
52	M*	5.4	3.1	44.5	6.7	15.0
53	M*	6.7	3.6	75.7	9.8	13.0

SEPTEMBER 1975 (Continued)

Specimen No.	Sex	Test Diameter (cm)	Test Height (cm)	Drained Weight (gm)	Gonad Weight (gm)	Gonadal Yield (%)
54	F	6.6	3.1	78.9	12.0	15.2
55	M	7.0	3.4	77.3	13.4	17.4
56	F	5.3	2.7	38.8	5.8	14.9
57	M	6.2	3.2	61.5	12.2	19.9
58	M	6.1	3.2	56.8	6.8	12.0
59	F	7.8	4.0	108.0	14.7	13.6
60	F	6.0	3.2	60.1	13.3	22.1
61	F*	5.9	3.2	46.3	5.6	12.2
62	F*	5.5	2.9	44.2	7.6	17.2
63	F	5.7	3.2	52.4	10.3	19.7
64	F	5.0	2.8	33.6	4.7	13.9
65	M	7.3	3.5	81.3	10.4	12.9
66	M*	6.1	3.1	57.6	9.0	15.7
67	M*	5.5	2.9	44.1	4.0	9.1
68	F	5.9	3.1	53.1	9.6	18.2
69	M*	5.1	2.7	34.0	4.6	13.7
70	F	6.2	3.3	61.9	12.4	20.0
71	M	7.2	3.8	94.4	20.2	21.4
72	M	7.5	4.0	100.9	19.4	19.2
73	F	6.5	3.5	84.6	17.6	20.8
74	F	5.6	3.0	48.8	11.9	24.3
75	F	5.5	3.1	46.9	5.7	12.1
76	F	6.1	3.7	56.4	13.2	23.4
77	F	5.7	2.9	54.3	10.9	20.1
78	F	5.7	3.0	51.2	10.2	19.9
79	F	4.9	2.5	36.1	3.3	9.2
80	F	5.8	3.1	51.7	10.9	21.2
81	F	7.0	3.6	82.2	16.1	19.6
82	F	5.1	2.8	40.1	6.0	14.9
83	F*	6.5	3.4	64.2	10.6	16.4
84	M	8.1	4.0	105.2	17.3	16.4
85	F*	5.7	3.4	50.2	5.8	11.5
86	F	5.1	2.9	37.9	9.2	24.4
87	F	6.3	3.2	57.9	14.4	24.8
88	M	6.5	3.4	68.5	15.1	22.0
89	F	6.7	3.6	82.3	13.6	16.6
90	F	5.4	3.2	42.8	10.1	23.6
91	F	6.1	3.2	57.4	13.6	23.8
92	F	6.7	3.8	80.2	19.4	24.1
93	F	5.3	2.7	41.0	5.6	13.6
94	M	8.1	4.1	115.0	20.1	17.5
95	F	6.4	3.7	70.7	15.4	21.8
96	F*	6.8	3.6	88.1	12.2	13.8
97	F	6.1	3.1	61.1	6.8	11.1
98	M	6.8	3.7	67.1	10.8	16.1
99	M	6.6	3.5	74.1	14.6	19.7
100	F*	6.3	3.4	62.9	10.8	17.2
101	F	6.3	3.4	67.8	12.5	18.4
102	F	6.5	3.6	68.8	12.4	18.1
103	M*	4.8	2.2	29.8	4.2	14.2
104	M	7.0	3.4	78.7	16.6	21.1

* Sex was confirmed histologically.

OCTOBER 1975

Specimen No.	Sex	Test Diameter (cm)	Test Height (cm)	Drained Weight (gm)	Gonad Weight (gm)	Gonadal Yield (%)
1	M	8.0	4.5	106.4	17.9	16.8
2	F	7.0	4.0	96.4	24.9	25.8
3	M	6.8	3.5	77.7	13.9	17.8
4	F	7.5	3.9	97.9	18.4	18.8
5	F	6.9	3.4	73.3	17.4	23.8
6	M*	7.0	3.6	76.6	17.5	22.8
7	F	7.0	3.8	76.8	20.6	26.7
8	M	6.6	3.5	67.3	14.4	21.4
9	F	6.5	3.6	73.7	22.1	29.9
10	F	6.6	3.5	78.7	17.8	22.7
11	F	6.1	3.2	63.8	13.7	21.5
12	M	7.0	3.8	72.8	13.7	18.8
13	M	7.0	3.9	83.8	23.2	27.7
14	F	6.8	3.6	82.5	21.6	26.2
15	M	6.3	3.4	63.4	15.0	23.7
16	M	6.8	3.5	67.1	10.2	15.2
17	M	6.7	3.5	78.2	19.5	25.0
18	F	6.7	3.3	68.4	18.3	26.7
19	F	6.1	3.5	60.0	11.2	18.7
20	F	6.7	3.8	74.8	20.0	26.7
21	M	7.3	3.4	81.2	15.3	18.9
22	M	8.2	3.9	130.6	33.2	25.4
23	F*	6.6	3.4	77.5	9.6	12.3
24	M	7.0	3.6	62.9	4.1	6.5
25	M	6.4	3.5	64.9	13.2	20.3
26	F	6.6	3.6	66.6	13.6	20.4
27	M	6.5	3.4	57.2	13.3	23.2
28	F	6.8	4.0	78.0	14.5	18.6
29	F	6.5	3.4	54.7	9.9	18.1
30	F	6.6	3.2	69.5	14.0	20.1
31	F	7.5	4.3	109.7	23.0	20.9
32	F	7.6	4.0	100.5	23.7	23.5
33	M	7.2	3.2	82.2	19.5	23.7
34	F	7.8	4.2	87.4	16.5	18.8
35	F	6.7	3.6	73.4	12.6	17.1
36	F	6.5	3.4	66.2	9.1	13.8
37	M	7.1	3.5	86.8	17.9	20.6
38	F	6.3	3.2	60.2	7.1	11.7
39	F	6.6	3.4	62.0	10.0	16.1
40	M	5.9	2.8	47.0	5.7	12.0
41	F	6.6	3.4	79.7	20.1	25.2
42	M	6.8	3.3	73.8	12.9	17.5
43	M	6.8	3.4	72.4	17.0	23.4
44	F	6.9	3.4	84.1	19.0	22.6
45	F	7.7	4.0	103.9	25.1	24.2
46	F	6.2	3.1	66.9	14.7	22.0
47	F	6.4	3.0	65.5	16.1	24.6
48	F	6.2	3.3	59.7	11.9	19.9
49	F	6.0	3.1	44.8	7.8	17.4
50	M	7.0	3.4	77.8	11.6	14.9
51	M	6.5	3.5	73.4	19.1	26.1
52	M	5.8	3.2	53.2	11.0	20.7
53	F	6.7	3.3	60.5	8.2	13.6

OCTOBER 1975 (Continued)

Specimen No.	Sex	Test Diameter (cm)	Test Height (cm)	Drained Weight (gm)	Gonad Weight (gm)	Gonadal Yield (%)
54	F	6.0	3.2	52.3	7.5	14.4
55	M	6.7	3.2	79.3	17.1	21.6
56	M	6.4	3.2	55.8	3.5	6.3
57	M	7.3	3.9	90.9	20.6	22.7
58	F	5.8	3.3	53.6	9.4	17.4
59	M	5.1	2.8	37.0	8.4	22.7
60	F	6.4	3.5	74.4	14.2	19.1
61	M	7.4	4.1	99.4	19.6	19.7
62	M*	5.6	3.1	50.0	8.2	16.3
63	F	6.2	3.1	62.2	10.3	16.6
64	F	6.5	3.3	68.7	12.7	18.6
65	F	6.2	3.1	55.3	12.2	22.1
66	M	5.4	2.6	38.0	5.1	13.4
67	F*	5.2	2.8	49.3	3.2	8.3
68	M	5.9	2.9	32.6	11.4	23.0
69	F*	5.1	2.7	54.8	3.9	12.0
70	M	6.0	3.2	55.9	9.4	17.2
71	F	6.0	3.0	41.3	10.8	19.3
72	F	5.6	3.0	49.2	5.6	13.4
73	F	5.8	3.0	49.8	7.4	15.0
74	F	5.9	3.2	74.6	5.5	11.1
75	M	6.6	3.4	100.8	17.8	23.8
76	F	7.3	3.9	60.4	28.3	28.1
77	F	6.3	3.3	60.4	15.4	25.5
78	M	7.0	3.5	72.8	14.9	20.5
79	M	6.6	3.4	64.8	15.2	23.4
80	M*	5.8	3.1	52.8	8.2	15.5
81	F	6.1	3.0	55.8	15.4	27.6
82	F	5.9	2.7	45.6	8.5	18.7
83	M	6.2	3.0	49.4	4.2	8.6
84	M	6.5	3.4	62.8	8.9	14.1
85	M	5.8	3.1	50.1	11.1	22.1
86	M	7.2	3.4	76.8	16.9	22.0
87	F	5.3	3.0	43.8	6.8	15.5
88	F	7.3	3.8	88.3	16.8	19.0
89	F	5.1	2.8	32.4	4.6	14.2
90	F	5.1	2.4	36.2	5.9	16.3
91	F	6.6	3.5	68.2	13.7	20.2
92	F	6.5	3.5	63.7	12.8	20.1
93	F	7.4	3.8	91.1	17.3	19.0
94	F	7.4	4.0	100.3	14.5	14.4
95	F	5.4	2.7	48.4	12.6	25.9
96	F	6.7	3.2	67.5	13.4	19.9
97	F	6.7	3.4	70.6	10.2	14.5
98	M	6.1	3.2	47.0	11.2	23.9
99	F	6.0	3.5	59.8	9.2	15.4
100	F	5.9	3.1	57.8	13.8	23.8
101	M	5.8	3.1	53.5	13.6	25.5
102	F	6.1	3.0	55.6	9.0	16.2
103	M	6.6	3.4	73.2	15.2	20.8
104	M	6.0	2.7	48.0	13.3	27.8

* Sex was confirmed histologically.

NOVEMBER 1975

Specimen No.	Sex	Test Diameter (cm)	Test Height (cm)	Drained Weight (gm)	Gonad Weight (gm)	Gonadal Yield (%)
1	F	7.3	3.3	88.3	22.8	25.6
2	M	6.4	3.3	76.6	21.3	27.8
3	M	8.0	3.8	113.6	30.2	26.6
4	M	7.4	3.2	90.0	26.4	29.3
5	M	8.4	4.0	107.1	19.4	18.1
6	M	6.6	3.2	70.6	20.6	29.2
7	M	6.7	3.1	74.1	24.1	32.6
8	M	7.8	3.8	99.4	20.5	20.6
9	F	7.2	3.6	91.8	21.9	23.8
10	F	6.6	3.8	88.4	29.0	32.8
11	M	6.4	3.3	64.6	13.7	21.2
12	F	6.0	3.4	65.4	15.4	23.5
13	M	7.1	3.6	87.5	20.8	23.8
14	F	6.6	3.4	70.1	20.4	29.1
15	F	7.4	3.6	102.9	24.8	24.1
16	M	6.3	3.3	68.2	16.4	24.1
17	M	6.8	3.5	79.6	20.4	25.6
18	M	7.2	3.5	98.9	25.7	26.0
19	M	7.2	3.9	94.6	23.7	25.0
20	M	5.7	2.8	48.5	14.0	28.9
21	M	6.8	3.4	79.6	17.0	21.3
22	F	7.8	3.8	100.8	17.0	16.8
23	F	7.2	3.9	89.1	19.7	22.1
24	M	7.2	3.6	85.6	19.8	23.1
25	M	6.6	3.3	72.5	19.1	26.3
26	F	7.6	4.0	105.7	19.1	18.0
27	M	7.1	4.0	96.7	32.0	33.1
28	F	7.0	3.4	82.7	14.3	17.3
29	M	6.7	3.4	78.5	24.7	31.5
30	F	6.0	2.9	63.4	11.7	18.4
31	M	7.6	3.8	105.8	22.2	21.0
32	M	7.0	3.5	78.8	18.6	23.6
33	F	6.9	3.6	87.6	13.2	15.1
34	F	5.7	2.5	42.8	6.3	14.6
35	M	7.2	3.9	100.2	27.2	27.1
36	M	6.1	3.3	62.2	10.8	17.4
37	F	7.2	3.6	91.6	15.5	17.0
38	F	7.6	4.2	106.7	27.3	25.6
39	M	5.8	3.0	48.0	9.7	20.1
40	F	7.0	3.8	89.0	24.4	27.5
41	M	7.9	4.3	99.4	17.2	17.3
42	M	7.8	4.0	102.9	21.0	20.4
43	F	7.4	3.8	91.7	15.8	17.2
44	M	6.4	3.4	60.6	10.9	18.0
45	M	6.6	3.0	76.2	21.0	27.6
46	M	7.1	3.5	83.6	12.5	15.0
47	F	7.5	3.7	97.4	19.2	19.7
48	M	6.2	2.9	59.9	12.8	21.4
49	M	7.5	3.4	87.1	16.9	19.4
50	M	7.8	4.0	109.4	30.2	27.6
51	F	7.2	3.5	92.9	19.0	20.5
52	F	5.9	3.2	58.0	12.1	20.9
53	F	7.5	3.8	89.4	13.4	15.0

NOVEMBER 1975 (Continued)

Specimen No.	Sex	Test Diameter (cm)	Test Height (cm)	Drained Weight (gm)	Gonad Weight (gm)	Gonadal Yield (%)
54	M	6.0	3.2	58.6	13.7	23.4
55	F	5.5	2.6	46.5	10.4	22.4
56	F	6.0	3.0	59.2	13.3	22.5
57	M	5.5	2.9	46.6	12.6	27.1
58	F	6.4	3.7	77.3	19.2	24.8
59	F	6.1	3.3	59.5	12.6	21.2
60	F	5.7	2.9	55.9	12.1	21.6
61	F	6.6	3.6	77.9	16.9	21.7
62	M	6.3	3.3	65.0	11.7	18.0
63	M	5.8	2.8	53.9	11.9	22.1
64	F	6.2	3.4	62.1	12.9	20.8
65	F	5.8	3.1	50.2	11.6	23.0
66	M	5.8	3.1	47.9	6.4	13.4
67	M	5.6	3.2	51.5	12.7	24.6
68	F	6.8	3.7	79.1	12.2	15.5
69	F	7.9	4.0	115.6	22.9	19.8
70	F	7.0	3.7	71.5	17.0	23.8
71	M	7.0	3.7	87.4	22.2	25.4
72	M	6.7	3.6	77.3	11.6	15.1
73	M	6.4	3.3	72.2	18.2	25.2
74	F	6.2	3.1	60.7	11.4	18.7
75	F	8.0	3.8	99.2	17.0	17.2
76	M	7.6	4.0	107.7	23.7	22.0
77	M	7.2	3.7	80.6	12.7	15.7
78	M	7.1	3.7	85.2	20.1	23.6
79	F	6.4	3.1	69.9	16.8	24.0
80	F	5.8	3.2	50.3	9.7	19.3
81	M	6.7	3.5	80.7	25.4	31.5
82	F	8.3	4.7	129.4	18.5	14.3
83	F	7.8	4.2	102.2	20.6	20.2
84	M	7.0	3.7	80.0	15.4	19.3
85	F	6.0	3.2	59.3	11.2	19.0
86	F	6.5	3.3	68.8	14.0	20.4
87	F*	7.4	3.4	60.0	5.7	9.5
88	F	6.9	3.5	80.5	17.3	21.6
89	F	6.6	3.4	78.5	16.1	20.5
90	M	6.9	3.8	83.2	19.2	23.1
91	F	6.0	3.1	62.6	11.0	17.7
92	F	7.3	3.6	88.2	20.0	22.7
93	M	7.0	3.8	86.5	20.1	23.3
94	F	6.1	3.1	57.0	8.8	15.4
95	M	6.9	3.4	83.5	21.1	25.3
96	F	6.8	3.8	87.2	15.2	17.5
97	M	5.2	2.8	39.8	7.4	18.7
98	F	7.5	4.0	95.5	18.6	19.4
99	F	6.4	3.3	66.3	13.4	20.1
100	M	6.5	3.3	73.4	19.6	26.7
101	M	7.4	3.9	87.1	20.3	23.2
102	F	6.8	3.7	82.4	16.4	19.9
103	M	6.6	3.3	67.8	17.7	26.1
104	F	6.2	3.2	63.3	13.5	21.3

* Sex was confirmed histologically.

DECEMBER 1975

Specimen No.	Sex	Test Diameter (cm)	Test Height (cm)	Drained Weight (gm)	Gonad Weight (gm)	Gonadal Yield (%)
1	F	7.3	3.7	94.2	25.8	27.3
2	M	6.4	3.2	66.6	22.4	33.7
3	M	7.4	4.0	97.4	18.4	18.9
4	M	7.4	3.6	94.2	31.2	33.2
5	M	5.4	2.9	46.7	9.2	19.6
6	M	7.5	3.7	99.7	32.1	32.2
7	M	6.5	3.3	73.9	16.9	22.9
8	F	5.7	2.7	52.6	15.3	29.0
9	M	5.6	2.7	45.9	9.4	20.4
10	F	7.6	4.0	101.4	28.3	27.9
11	M	7.8	3.7	105.9	18.9	17.8
12	F	7.4	3.5	87.8	19.1	21.8
13	F	5.6	3.2	40.7	9.2	22.6
14	M	6.8	3.7	72.7	19.8	27.2
15	M	5.5	2.6	38.3	8.8	22.8
16	M	5.1	2.6	32.9	5.6	17.0
17	M	6.1	3.3	59.1	11.0	18.6
18	M	5.4	2.8	44.1	8.3	18.9
19	F	6.6	3.3	79.8	23.6	29.5
20	F	6.0	3.0	54.1	11.1	20.5
21	M	7.1	3.5	89.4	32.2	36.0
22	M	6.5	3.2	71.9	13.9	19.3
23	F	6.0	3.2	59.1	15.6	26.3
24	F	6.0	3.6	60.8	12.0	19.7
25	F	8.2	4.2	109.2	20.0	18.3
26	F	6.2	3.2	62.2	16.3	26.3
27	F	6.2	3.4	64.0	16.7	26.1
28	F	6.5	3.4	65.5	18.5	28.2
29	F	7.0	3.3	75.7	20.8	27.5
30	M	7.0	3.3	90.5	21.2	23.4
31	F	7.3	3.9	84.2	23.7	28.2
32	M	7.3	3.7	96.5	28.7	29.8
33	F*	7.7	4.2	90.5	20.5	22.6
34	M	7.4	3.6	94.4	25.7	27.3
35	F	6.4	3.6	74.9	18.9	25.2
36	F	5.7	2.8	47.6	13.6	28.5
37	M	6.8	3.3	77.7	16.8	21.7
38	M	6.1	3.0	63.2	22.1	34.9
39	M	6.5	3.2	71.1	20.3	28.6
40	M	6.5	3.2	72.6	18.3	25.2
41	M	7.1	3.5	97.2	21.8	22.4
42	F	6.0	3.1	60.9	15.6	25.6
43	F	8.1	4.3	115.1	22.7	19.7
44	F	7.4	4.0	100.9	27.3	27.1
45	F	8.6	4.1	125.9	32.0	25.4
46	F	6.3	3.5	66.4	19.7	29.7
47	M	5.7	3.2	57.5	14.3	24.9
48	M	6.2	3.0	58.1	15.6	26.8
49	F	6.3	3.2	58.2	16.6	28.6
50	F	7.4	4.0	100.0	23.8	23.8
51	F	6.4	3.0	64.4	8.9	13.8
52	F	6.0	3.4	65.0	23.0	35.4
53	M	6.6	3.5	62.4	13.4	21.4

DECEMBER 1975 (Continued)

Specimen No.	Sex	Test Diameter (cm)	Test Height (cm)	Drained Weight (gm)	Gonad Weight (gm)	Gonadal Yield (%)
54	F	6.4	3.1	69.7	14.3	20.5
55	F	6.1	3.5	58.6	14.7	25.0
56	M	6.5	3.5	80.0	22.8	28.6
57	M	5.8	3.0	54.3	11.0	20.3
58	F	6.6	3.7	84.0	20.2	24.1
59	F	6.9	3.7	97.8	29.2	29.8
60	M	6.3	3.2	74.7	19.9	26.6
61	F	6.2	3.2	66.8	21.1	31.6
62	M	6.3	3.3	73.8	21.7	29.4
63	F	6.1	3.1	64.1	21.9	34.2
64	M	6.4	3.2	77.8	20.1	25.9
65	F	6.0	2.9	50.0	6.1	12.2
66	M	5.8	3.0	58.0	18.1	31.2
67	F	5.6	3.0	48.3	11.5	23.7
68	F	5.6	3.0	50.3	12.2	24.1
69	M	5.9	3.1	60.9	13.5	22.2
70	M	7.0	3.6	93.2	22.4	24.0
71	F	6.0	3.2	60.8	15.5	25.5
72	M	6.6	3.3	70.9	19.1	26.9
73	M	6.8	3.3	69.7	15.9	22.8
74	M	6.2	3.2	55.0	8.1	14.7
75	M	6.6	3.3	81.2	17.0	20.9
76	M	6.4	3.6	72.8	21.0	28.8
77	F	7.2	3.2	70.9	11.4	16.1
78	M	7.6	3.6	98.9	25.9	26.2
79	M	7.2	3.5	82.2	20.8	25.4
80	M	6.2	3.2	63.1	13.0	20.6
81	F	6.7	3.3	78.2	24.7	31.6
82	M	7.3	4.0	85.6	22.2	25.9
83	F	6.5	3.6	85.3	18.0	21.1
84	M	6.4	3.5	66.6	14.7	22.1
85	M	6.1	3.1	54.1	12.8	23.8
86	F	7.3	3.8	105.1	24.7	23.5
87	F	6.2	3.2	69.5	17.5	25.1
88	F	6.3	3.2	55.2	12.5	22.6
89	F	6.0	3.0	62.6	20.0	32.0
90	F	7.8	4.1	115.1	19.7	17.1
91	M	6.2	3.2	68.7	16.4	23.9
92	F	6.6	3.6	77.0	17.3	22.5
93	F	5.6	3.0	53.9	13.1	24.4
94	F	7.2	3.7	95.5	19.6	20.5
95	M	6.9	3.3	74.4	18.0	24.2
96	M	7.8	4.0	95.8	21.3	22.2
97	F	6.5	3.2	53.0	11.4	21.6
98	F	7.4	4.0	94.0	15.0	15.9
99	F	6.3	3.2	67.8	20.3	29.9
100	M	6.8	3.5	78.3	15.3	19.5
101	F	7.1	4.3	94.2	21.3	22.6
102	M	6.0	3.0	56.5	12.8	22.8
103	M	5.7	3.2	62.1	18.8	30.4
104	F	6.4	3.3	74.0	20.5	27.7

* Sex was confirmed histologically.

JANUARY 1976

Specimen No.	Sex	Test Diameter (cm)	Test Height (cm)	Drained Weight (gm)	Gonad Weight (gm)	Gonadal Yield (%)
1	M	6.3	3.1	67.1	15.0	22.4
2	F	6.2	3.1	60.8	18.7	30.8
3	M	7.3	3.8	99.7	29.3	29.4
4	M	6.8	3.2	65.2	13.4	20.6
5	F	6.2	3.0	64.1	13.8	21.5
6	F	8.0	3.8	120.5	36.9	30.7
7	M	5.8	3.0	54.7	15.8	28.9
8	F	6.8	3.6	87.9	18.7	21.3
9	F	6.4	3.5	71.6	25.6	35.7
10	F	7.2	3.7	102.5	34.5	33.6
11	F	7.1	3.4	72.1	14.0	19.3
12	M	6.6	3.8	73.5	17.6	24.0
13	M	6.8	3.3	79.3	15.1	19.1
14	M	6.0	3.0	57.1	12.5	21.9
15	M	5.8	2.9	63.2	19.2	30.4
16	F	6.4	3.5	88.7	32.6	36.7
17	M	6.8	3.3	75.7	16.6	22.0
18	M	5.4	2.8	44.3	9.0	20.4
19	M	7.0	3.4	77.5	20.7	26.7
20	M	5.9	3.0	54.0	13.9	25.7
21	M	6.8	3.4	68.6	15.7	22.9
22	F	6.4	3.6	58.5	12.6	21.5
23	M	6.8	3.6	69.5	21.5	30.9
24	M	6.8	3.4	73.6	13.8	18.8
25	F	7.4	3.6	104.0	35.5	34.1
26	M	5.8	2.8	60.6	19.2	31.7
27	M	5.8	3.0	56.5	15.3	27.1
28	F	6.6	3.3	61.0	18.6	30.4
29	F	7.5	3.9	84.7	28.0	33.1
30	F	6.8	3.4	72.5	16.9	23.3
31	M	7.0	3.2	77.7	15.4	19.9
32	F	6.5	3.2	72.9	25.8	35.4
33	M	7.4	3.6	91.2	23.0	25.2
34	M	6.9	3.5	76.6	18.3	23.8
35	M	7.0	3.3	83.5	19.2	23.0
36	F	7.0	3.5	65.4	12.6	19.2
37	M	7.3	3.5	87.6	14.4	16.4
38	F	6.2	3.2	62.4	18.9	30.3
39	F	7.1	3.6	92.3	23.1	25.0
40	F	5.5	2.7	38.3	5.5	14.4
41	F	5.8	3.0	50.9	10.2	20.1
42	F	6.8	3.2	73.8	28.5	38.6
43	M	5.8	2.8	51.4	13.6	26.4
44	M	5.3	2.9	44.0	9.4	21.3
45	F	5.0	2.7	38.0	6.8	17.9
46	F	7.8	3.8	110.3	28.7	26.0
47	F	5.8	3.0	54.2	12.0	22.0
48	M	7.5	3.6	98.7	22.6	22.9
49	M	6.8	3.6	73.3	16.8	22.9
50	F	7.9	4.0	104.0	22.7	21.9
51	M	5.8	3.1	50.4	10.6	21.1
52	M	6.3	2.9	61.7	15.3	24.8
53	M	6.2	3.0	61.1	19.4	31.7

JANUARY 1976 (Continued)

Specimen No.	Sex	Test Diameter (cm)	Test Height (cm)	Drained Weight (gm)	Gonad Weight (gm)	Gonadal Yield (%)
54	F	6.3	3.1	52.7	9.7	18.4
55	F	6.7	3.3	81.0	32.0	39.5
56	F	5.4	2.6	32.5	5.6	17.2
57	F	6.4	3.0	61.0	16.0	26.3
58	M	5.4	2.6	43.0	11.6	27.0
59	F	7.9	4.0	122.6	30.9	25.2
60	F	6.1	3.0	57.8	10.7	18.5
61	F	6.0	2.8	59.1	20.8	35.2
62	M	6.3	3.2	59.8	13.6	22.7
63	F	8.0	3.6	110.8	34.8	31.4
64	M	7.2	3.6	88.8	24.8	27.9
65	F	5.5	2.8	44.1	14.4	32.7
66	F	7.1	3.6	84.3	16.9	20.0
67	F	6.7	3.1	59.8	8.1	13.6
68	M	5.8	3.0	57.7	14.2	24.6
69	M	6.1	3.1	60.0	17.5	29.2
70	F	5.4	2.6	45.6	14.2	31.1
71	F	7.0	3.9	94.6	24.7	26.1
72	M	6.7	3.7	93.4	25.8	27.6
73	M	7.2	3.4	91.3	23.5	25.7
74	F	5.7	2.6	52.8	14.7	27.8
75	M	5.8	2.9	58.6	15.9	27.2
76	M	6.4	3.2	70.9	14.8	20.8
77	M	7.0	3.6	85.5	28.0	32.7
78	F	6.1	3.0	61.1	13.8	22.6
79	M	5.2	2.7	44.7	10.6	23.7
80	M	7.2	3.6	90.2	22.3	24.7
81	F	7.0	3.8	90.1	31.1	34.6
82	F	7.1	3.4	82.9	22.3	26.9
83	F	6.2	2.9	63.9	23.0	36.0
84	F	6.1	2.9	59.2	12.7	21.5
85	F	6.7	3.4	81.0	26.3	32.5
86	M	6.0	3.1	57.6	16.5	28.7
87	M	6.3	3.2	78.3	23.3	29.7
88	M	7.6	3.4	115.2	29.3	25.4
89	M	6.4	3.0	70.0	12.0	17.2
90	F	6.5	3.3	65.8	16.1	24.4
91	M	5.6	2.8	50.7	12.8	25.3
92	M	7.7	3.6	91.4	17.8	19.5
93	F	5.0	2.6	40.7	7.7	18.8
94	F	5.4	2.8	48.9	11.1	22.6
95	M	6.0	3.1	57.7	13.7	23.7
96	F	6.9	3.3	102.5	35.2	34.4
97	M	6.3	3.6	78.2	17.8	22.8
98	F	6.0	3.1	67.2	20.0	29.8
99	F	5.4	2.7	46.9	12.3	26.2
100	M	7.8	3.7	118.1	32.5	27.5
101	M	5.5	2.8	55.0	13.3	24.2
102	F	5.3	2.7	42.5	8.3	19.4
103	F	6.7	3.6	88.3	20.2	22.8
104	M	6.7	3.3	77.3	17.2	22.3

FEBRUARY 1976

Specimen No.	Sex	Test Diameter (cm)	Test Height (cm)	Drained Weight (gm)	Gonad Weight (gm)	Gonadal Yield (%)
1	M	6.8	3.7	67.5	12.8	19.0
2	M	5.5	3.3	56.5	16.3	28.8
3	F	6.0	3.0	61.7	25.2	40.9
4	M	6.5	3.2	61.8	12.0	19.4
5	F	7.5	4.1	113.2	41.0	36.3
6	F	7.0	3.7	99.9	33.9	33.9
7	F	7.5	3.8	115.2	43.2	37.5
8	F	7.6	3.8	111.9	38.1	34.0
9	M	6.0	3.0	54.6	8.7	16.0
10	F	5.8	2.9	51.9	16.3	31.5
11	F	7.9	4.0	105.2	34.1	32.4
12	M	5.9	2.9	47.1	10.9	23.1
13	M	6.0	2.7	54.5	14.3	26.2
14	F	6.4	3.4	54.6	18.8	34.4
15	M	7.0	3.8	82.8	20.2	24.5
16	F	5.5	2.7	44.1	13.6	30.7
17	M	6.1	3.2	56.0	9.6	17.1
18	M	6.4	3.3	67.9	15.8	23.2
19	M	5.9	2.7	53.9	9.4	17.5
20	F	8.0	4.0	114.8	33.5	29.2
21	M	6.6	3.3	64.8	15.7	24.2
22	M	6.8	3.2	66.1	12.4	18.7
23	F	7.2	3.8	104.2	38.4	36.8
24	M	5.6	2.6	44.1	7.2	16.4
25	M	6.4	3.0	57.6	11.1	19.2
26	M	7.5	3.7	87.0	21.8	25.0
27	F	6.0	3.1	57.5	17.1	29.8
28	M	5.5	2.9	47.7	15.8	33.2
29	M	7.2	3.6	81.5	20.9	25.6
30	M	6.2	3.4	65.9	14.6	22.1
31	F	7.5	3.6	109.5	39.5	36.1
32	F	5.5	3.0	45.5	11.5	25.2
33	F	6.8	3.7	71.9	14.5	20.2
34	M	7.1	3.5	93.9	32.9	35.0
35	F	5.7	2.9	56.8	17.6	31.0
36	M	6.1	3.2	62.0	18.3	29.5
37	M	7.6	4.0	109.2	28.5	26.1
38	M	5.7	2.8	53.9	12.5	23.2
39	M	7.3	3.6	100.9	27.8	27.6
40	F	6.2	3.3	62.6	16.8	26.8
41	F	6.0	3.1	62.8	18.1	28.8
42	M	6.9	3.4	78.5	15.7	20.0
43	M	5.5	2.9	42.8	8.2	19.0
44	F	6.4	3.0	60.8	21.7	35.7
45	M	7.0	3.6	78.9	16.0	20.3
46	M	6.4	3.4	66.3	14.1	21.2
47	M	7.5	3.8	82.0	16.4	19.9
48	M	5.5	2.8	39.3	7.0	17.9
49	M	6.3	3.4	55.4	13.4	24.1
50	F	7.2	4.1	108.8	28.0	25.7
51	F	7.3	3.6	92.5	30.5	33.0
52	F	5.8	3.1	63.7	24.9	39.2
53	M	4.7	2.5	28.2	4.1	14.6

FEBRUARY 1976 (Continued)

Specimen No.	Sex	Test Diameter (cm)	Test Height (cm)	Drained Weight (gm)	Gonad Weight (gm)	Gonadal Yield (%)
54	M	5.9	3.0	48.2	10.4	21.5
55	M	5.5	3.0	41.0	7.7	18.8
56	F	5.9	3.1	47.3	11.6	24.4
57	F	6.3	3.0	61.0	22.3	36.6
58	M	7.0	3.7	76.4	15.7	20.5
59	M	6.0	3.0	47.5	9.2	19.5
60	M	5.2	2.5	38.9	8.6	22.1
61	M	5.5	2.6	34.8	6.4	18.5
62	M	6.9	3.9	73.4	18.4	25.0
63	M	5.2	2.9	34.9	8.6	24.6
64	F	5.3	3.0	43.6	11.2	25.6
65	F	5.6	2.8	43.6	11.1	25.5
66	M	6.9	3.7	74.4	19.3	25.9
67	M	7.0	3.6	75.3	13.4	17.8
68	M	6.4	3.6	63.6	14.3	22.4
69	F	7.1	3.7	75.2	21.6	28.7
70	F	5.4	2.8	44.0	14.2	32.4
71	M	5.7	2.6	47.4	13.6	28.6
72	M	6.4	3.2	64.9	19.6	30.3
73	F	5.2	2.6	42.2	10.3	24.4
74	M	6.0	3.2	50.4	12.0	23.7
75	M	5.8	3.1	54.8	15.0	27.4
76	F	5.6	3.0	48.8	13.3	27.3
77	F	7.4	4.0	88.7	20.4	22.9
78	F	5.4	2.9	40.0	11.5	28.8
79	F	5.9	2.9	44.0	9.5	21.4
80	M	5.8	2.8	48.5	8.2	17.0
81	M	4.9	2.5	32.4	6.5	20.0
82	M	6.0	3.0	53.9	13.7	25.4
83	M	6.6	3.3	62.4	19.7	31.6
84	F	7.6	3.6	79.0	17.6	22.3
85	F	6.9	3.6	90.5	23.5	26.0
86	M	6.4	3.0	67.0	15.5	23.2
87	M	5.8	2.8	40.5	9.2	22.8
88	F	5.6	3.0	51.0	16.1	31.6
89	M	5.9	3.3	54.4	10.1	18.5
90	M	7.0	3.6	83.1	20.9	25.2
91	F	5.6	2.9	51.7	11.7	22.7
92	M	6.8	3.5	69.5	13.7	19.8
93	M	5.6	2.9	40.3	6.4	15.9
94	M	6.3	3.2	56.2	11.7	20.8
95	F	6.4	3.8	80.6	33.1	41.0
96	F	6.3	2.9	57.7	16.8	29.2
97	M	6.8	3.3	75.2	11.3	15.0
98	F	6.6	3.5	75.8	29.8	39.3
99	M	6.7	3.5	71.9	16.8	23.3
100	M	6.6	3.4	63.2	13.4	21.1
101	M	5.5	2.8	41.3	7.8	19.0
102	M	6.6	4.1	88.1	23.3	26.4
103	F	6.9	3.5	84.7	32.4	38.2
104	F	7.0	3.4	86.2	31.2	36.2
105	F	6.7	3.5	75.5	24.2	32.1

MARCH 1976

Specimen No.	Sex	Test Diameter (cm)	Test Height (cm)	Drained Weight (gm)	Gonad Weight (gm)	Gonadal Yield (%)
1	F	6.2	3.3	59.7	10.3	17.3
2	M	6.2	3.1	62.8	10.3	16.4
3	F	5.9	3.2	58.8	14.5	24.6
4	M	6.0	3.3	56.5	11.2	19.9
5	F	5.8	3.2	57.6	15.4	26.7
6	M	5.8	2.7	53.2	7.5	14.1
7	M	5.3	2.6	43.5	8.8	20.2
8	M	6.5	3.3	70.1	15.9	22.7
9	F	6.4	3.2	55.8	8.0	14.3
10	M	7.4	3.9	95.0	20.9	22.0
11	M	5.6	3.2	49.4	7.4	15.1
12	F	6.6	3.8	91.7	26.6	29.0
13	M	7.3	3.7	95.2	17.2	18.0
14	F	5.7	2.6	53.2	13.6	25.6
15	M	5.6	2.7	44.9	9.0	20.0
16	F	6.3	3.0	69.3	16.5	23.8
17	F	7.0	3.5	81.2	10.8	13.3
18	F	6.2	3.3	59.7	5.0	8.4
19	M	6.2	3.2	67.0	11.8	17.7
20	F	6.5	3.0	60.2	14.0	23.2
21	F	5.5	3.0	48.0	6.3	13.2
22	M	6.8	3.1	75.6	16.2	21.4
23	F	6.9	3.6	85.5	21.0	24.6
24	F	7.2	3.5	104.2	33.0	31.7
25	M	6.8	3.2	76.2	25.3	33.2
26	M	7.2	3.4	82.0	14.0	17.1
27	F	6.5	3.5	68.6	21.1	30.8
28	F	7.8	4.2	106.6	27.1	25.4
29	M	6.9	3.6	78.7	15.2	19.4
30	F	7.1	3.5	91.7	16.7	18.2
31	M	6.1	3.2	64.5	12.2	18.8
32	F	7.3	3.8	93.4	25.9	27.8
33	M	7.6	3.7	94.6	15.8	16.7
34	M	7.0	3.8	84.8	16.0	18.8
35	F	7.2	4.1	103.2	32.7	31.7
36	M	6.5	3.2	71.5	12.6	17.6
37	M	7.1	3.7	68.6	9.5	13.8
38	F	7.1	4.1	97.3	7.2	7.4
39	M	6.4	3.3	70.7	13.2	18.7
40	F	6.4	3.3	74.1	21.7	29.3
41	F	6.9	3.6	98.7	31.3	31.7
42	F	6.6	3.6	67.9	14.3	21.0
43	F	7.0	3.8	93.5	20.5	21.9
44	M	6.9	3.5	70.6	17.7	25.1
45	M	7.3	4.0	99.4	22.4	22.5
46	F	6.9	3.8	72.4	7.1	9.8
47	F	7.2	3.4	88.4	25.0	28.2
48	F	6.6	3.4	68.4	3.3	4.9
49	M	7.3	3.4	90.2	17.7	19.7
50	F	7.7	3.8	105.1	9.6	9.1
51	M	6.7	3.6	78.6	15.3	19.4
52	F	6.6	3.3	77.9	19.7	25.3
53	M	7.0	3.3	79.1	14.3	18.0

MARCH 1976 (Continued)

Specimen No.	Sex	Test Diameter (cm)	Test Height (cm)	Drained Weight (gm)	Gonad Weight (gm)	Gonadal Yield (%)
54	F	7.5	3.7	96.2	17.9	18.6
55	F	7.9	4.1	127.7	40.2	31.5
56	M	7.8	3.9	98.4	15.2	15.4
57	F	7.0	3.6	73.1	8.2	11.2
58	F	7.0	3.4	106.0	26.1	24.6
59	F	7.4	3.8	98.5	22.2	22.5
60	M	7.2	3.8	85.0	18.6	21.9
61	F	6.9	3.5	65.5	4.5	6.9
62	M	7.7	3.5	102.5	22.8	22.3
63	M	5.6	2.8	37.2	6.0	16.2
64	F	7.8	3.6	115.3	19.7	17.1
65	M	6.9	3.8	66.9	7.6	11.4
66	M	6.6	3.2	79.4	21.6	27.2
67	M	7.4	3.7	106.0	20.1	19.0
68	M	6.7	3.7	74.2	16.1	21.7
69	F	6.9	3.4	93.5	14.4	15.4
70	M	7.3	3.6	90.8	18.1	19.9
71	M	7.4	3.6	89.7	10.5	11.7
72	M	6.2	2.9	62.2	10.3	16.5
73	F	7.7	4.2	110.4	8.1	7.4
74	F	7.4	3.5	95.3	17.7	18.6
75	F	6.3	3.3	77.9	21.7	27.9
76	F	6.4	3.3	74.6	22.6	30.3
77	M	7.1	3.4	84.1	15.5	18.4
78	F	6.5	3.2	88.0	28.2	32.0
79	F	7.7	3.5	111.6	19.4	17.4
80	F	5.7	3.0	53.5	15.2	28.4
81	F	6.9	3.9	92.2	24.3	26.4
82	F	6.4	3.2	83.0	24.8	29.9
83	F	6.4	3.7	78.3	9.0	11.5
84	M	6.1	2.8	54.8	9.9	18.1
85	F	6.3	3.4	69.6	11.1	16.0
86	M	5.7	2.9	57.8	11.7	20.3
87	M	6.7	3.1	61.9	6.6	10.7
88	M	6.4	3.1	68.4	13.5	19.8
89	F	6.9	3.6	95.5	27.7	29.0
90	M	6.9	3.8	78.5	16.9	21.6
91	F	7.2	4.0	73.8	10.6	14.4
92	F	7.1	3.9	118.8	24.4	20.6
93	F	7.2	3.7	117.4	31.0	26.4
94	F	6.6	3.4	80.4	17.4	21.7
95	M	6.2	3.2	56.6	6.1	10.8
96	F	6.3	3.0	55.7	16.6	29.7
97	F*	5.6	3.0	40.8	0.6	1.5
98	F	7.6	4.1	121.0	28.5	23.6
99	F	6.2	3.2	57.6	5.7	9.9
100	M	6.7	3.4	83.5	15.2	18.2
101	F	6.3	3.1	65.2	8.7	13.3
102	F	6.3	3.0	73.2	16.2	22.1
103	M	7.4	3.5	74.6	5.0	6.7
104	F	7.0	3.6	85.4	15.4	18.1

* Sex was confirmed histologically.

Specimen No.	Sex	Test Diameter (cm)	Test Height (cm)	Drained Weight (gm)	Gonad Weight (gm)	Gonadal Yield (%)
1	M	6.9	3.3	68.8	17.7	25.7
2	F*	6.8	3.3	68.4	3.9	5.7
3	M	6.0	2.9	45.4	3.7	8.2
4	M	6.3	3.4	57.2	5.0	8.7
5	F*	7.0	3.6	65.5	3.1	4.8
6	M	7.0	3.6	76.9	12.7	16.6
7	M	6.6	3.4	52.1	2.3	4.5
8	F	6.2	3.5	55.0	5.1	9.3
9	M	6.4	3.2	56.7	4.2	7.3
10	F	6.8	3.6	77.8	16.7	21.5
11	M	7.5	3.7	77.9	7.6	9.7
12	M	6.9	3.3	58.5	3.1	5.3
13	F	7.6	3.9	82.6	5.9	7.1
14	M*	7.3	3.8	64.5	1.6	2.5
15	F	7.9	3.6	108.3	25.1	23.1
16	F	6.7	3.6	71.4	2.3	3.3
17	F*	6.7	3.4	63.1	3.2	5.0
18	F	7.0	3.5	68.3	2.5	3.6
19	F	6.6	3.2	55.1	5.1	9.3
20	M	6.0	3.1	58.4	8.2	14.0
21	F	6.6	3.0	68.5	7.2	10.5
22	F	6.6	3.4	64.0	3.7	5.8
23	F	6.0	3.2	54.1	13.4	24.8
24	F	5.4	2.8	43.3	3.8	8.7
25	F	6.3	3.2	45.0	2.8	6.1
26	M*	7.6	3.6	72.4	2.8	3.9
27	F	6.7	3.7	65.8	3.0	4.6
28	F	5.4	2.3	47.0	6.2	13.2
29	M	5.8	2.8	55.8	11.9	21.4
30	F	5.2	2.6	36.7	5.5	15.0
31	F	6.2	2.9	57.0	3.2	5.6
32	M	6.5	3.5	54.8	3.8	6.9
33	F	6.3	3.3	75.2	20.2	26.8
34	M	6.8	3.6	74.7	8.2	11.0
35	M	5.5	2.8	51.1	8.4	16.4
36	F	6.1	3.2	61.6	12.6	20.4
37	F	6.0	3.1	44.6	2.3	5.2
38	M	5.5	2.7	46.1	6.7	14.6
39	F	6.0	3.2	51.3	14.0	27.2
40	M	6.2	3.2	56.4	12.3	21.8
41	M	5.5	2.9	47.5	8.2	17.4
42	M	5.5	3.1	54.3	10.7	19.7
43	M	5.7	3.1	56.6	9.3	16.4
44	M	6.0	2.8	53.8	2.6	4.8
45	F	6.7	3.6	69.4	6.5	9.4
46	M	5.6	3.0	50.9	11.7	23.1
47	F	6.3	3.6	86.8	24.8	28.6
48	M	7.1	3.6	75.5	16.7	22.1
49	F	5.8	3.3	68.0	23.9	35.2
50	M	6.4	3.2	61.6	4.2	6.9
51	M	6.6	3.8	83.1	5.4	6.5
52	F	6.4	3.2	59.9	2.9	4.8
53	F	6.7	3.5	65.3	2.6	4.1

APRIL 1976 (Continued)

Specimen No.	Sex	Test Diameter (cm)	Test Height (cm)	Drained Weight (gm)	Gonad Weight (gm)	Gonadal Yield (%)
54	F	5.5	2.9	41.4	1.8	4.4
55	M	7.0	3.7	80.5	4.8	6.0
56	F	7.6	4.1	97.7	7.0	7.1
57	M	6.0	3.3	52.0	3.2	6.0
58	F	6.3	3.4	63.6	3.6	5.7
59	F	6.8	3.8	84.9	24.2	28.4
60	F	6.9	4.0	86.8	32.7	37.6
61	M	7.3	3.8	80.8	4.4	5.4
62	M*	7.6	3.9	81.1	1.6	1.9
63	F	6.8	3.8	91.9	25.7	27.9
64	F	7.0	3.7	82.2	3.4	4.1
65	F	7.0	3.4	79.8	6.0	7.5
66	F	7.7	4.1	102.7	4.8	4.6
67	M	7.8	3.8	111.7	7.8	7.0
68	M	7.5	3.8	89.4	5.8	6.4
69	F	7.5	4.0	89.7	6.5	7.2
70	F	6.8	3.7	64.4	3.6	5.6
71	F	7.4	3.8	77.8	4.5	5.8
72	M	5.1	2.6	32.6	2.7	8.4
73	M	6.5	3.3	80.5	16.5	20.5
74	F	7.6	3.8	96.7	5.6	5.7
75	M	6.8	3.4	68.5	4.4	6.4
76	F*	6.8	3.6	75.4	3.6	4.8
77	M*	7.2	3.7	89.9	2.8	3.2
78	M	6.0	3.2	54.1	12.4	23.0
79	M	7.0	3.3	89.0	8.2	9.3
80	F	7.0	3.5	87.3	9.1	10.4
81	F*	7.1	3.5	72.7	2.8	3.8
82	M	5.9	2.5	37.7	3.2	8.6
83	F	6.2	2.8	53.2	1.0	1.8
84	M	5.7	3.0	58.2	3.1	5.3
85	M	6.2	3.2	60.6	7.0	11.6
86	M*	7.0	3.4	84.0	4.4	5.2
87	F*	6.0	3.2	66.1	1.6	2.4
88	M	7.2	3.6	112.6	10.6	9.4
89	M	5.0	2.6	36.4	1.3	3.5
90	F	6.4	3.6	95.9	2.1	2.2
91	F	5.5	2.7	54.2	8.1	14.9
92	F	5.2	2.7	43.2	5.0	11.5
93	M	6.9	3.6	85.1	3.8	4.4
94	M	6.7	3.6	84.1	13.9	16.6
95	F	5.4	2.8	55.8	15.1	27.1
96	F*	4.9	2.6	28.7	0.6	2.2
97	M	6.4	3.4	80.6	16.7	20.7
98	M	6.6	3.6	97.8	9.7	10.0
99	M	6.1	3.1	60.1	9.1	15.1
100	F	6.1	3.0	79.4	19.1	24.0
101	M	5.4	3.0	51.9	8.7	16.8
102	F	7.2	3.6	105.8	11.3	10.6
103	F*	5.5	2.7	46.3	1.0	2.2
104	M	5.3	2.8	47.2	6.3	13.4

* Sex was confirmed histologically.

MAY 1976

Specimen No.	Sex	Test Diameter (cm)	Test Height (cm)	Drained Weight (gm)	Gonad Weight (gm)	Gonadal Yield (%)
1	F*	6.3	2.9	53.1	3.0	5.7
2	M	6.6	3.5	77.4	4.5	5.8
3	F*	5.9	3.2	31.5	2.2	6.8
4	F*	6.6	3.6	71.7	3.2	4.5
5	M	7.2	3.6	73.9	2.5	3.4
6	F	5.6	2.8	42.4	3.0	7.2
7	F	7.3	3.7	78.9	7.5	9.5
8	M	6.0	3.1	49.4	3.4	6.8
9	M	6.6	3.4	54.1	1.2	2.3
10	F	6.2	3.3	62.5	6.2	9.8
11	M	5.5	3.2	40.6	3.4	8.4
12	M	6.3	3.0	43.8	5.0	11.3
13	M	6.8	3.3	70.1	4.9	7.0
14	M	7.1	3.5	77.1	6.8	8.8
15	M*	5.6	3.0	42.4	2.7	6.3
16	F	7.5	3.8	93.0	6.8	7.3
17	F*	6.2	3.0	54.5	1.5	2.8
18	M	7.0	3.5	67.6	8.6	12.7
19	M	6.8	3.4	79.0	4.2	5.3
20	M	7.4	4.0	91.0	4.7	5.1
21	M	5.8	2.9	44.6	2.0	4.5
22	F*	6.6	3.4	68.2	1.7	2.5
23	F	6.0	3.2	51.5	3.1	6.0
24	M	5.6	3.2	44.5	5.7	12.8
25	F	5.8	3.0	50.5	2.6	5.2
26	F	6.8	3.4	80.1	6.4	8.0
27	M	6.6	3.6	73.8	7.6	10.3
28	F	7.4	3.5	94.9	20.0	21.0
29	F	6.6	3.5	73.6	3.9	5.3
30	F	6.0	3.4	58.4	4.6	8.0
31	M	8.0	4.3	104.9	7.5	7.2
32	F*	7.2	3.6	81.3	5.5	6.8
33	F*	6.2	2.9	52.9	1.4	2.6
34	M	6.8	3.3	81.3	15.1	18.6
35	F	6.7	3.5	78.5	9.2	11.7
36	M	6.5	3.8	73.7	7.4	10.0
37	F*	7.4	3.8	83.5	3.3	3.9
38	F*	7.9	4.0	91.6	3.3	3.6
39	F	6.6	3.0	56.4	2.7	4.8
40	F*	7.0	3.5	81.8	6.4	7.8
41	F*	6.6	3.1	59.5	2.6	4.4
42	M	7.3	3.7	83.3	5.8	7.0
43	M	7.0	3.4	94.0	22.1	23.5
44	M	7.8	3.4	81.4	10.0	12.3
45	M	8.1	4.0	115.4	5.8	5.0
46	M	7.0	3.0	64.4	3.7	5.8
47	M	7.1	3.2	90.4	8.7	9.7
48	F	6.3	3.4	60.3	7.0	11.7
49	F	6.1	3.4	60.3	3.0	4.9
50	F	6.7	3.4	66.4	5.9	8.8
51	F	6.6	3.3	69.1	5.2	7.4
52	M	6.3	3.4	60.5	9.0	14.9
53	F	7.0	3.7	64.0	5.3	8.3

MAY 1976 (Continued)

Specimen No.	Sex	Test Diameter (cm)	Test Height (cm)	Drained Weight (gm)	Gonad Weight (gm)	Gonadal Yield (%)
54	M	6.5	3.6	76.9	5.4	7.0
55	F	6.4	3.3	59.3	1.9	3.2
56	M*	6.0	3.0	45.3	2.8	6.2
57	F*	7.8	3.6	83.9	4.5	5.4
58	M	6.2	3.3	61.8	3.5	5.7
59	F	6.6	3.5	76.4	15.7	20.6
60	M	6.9	3.5	73.0	2.5	3.4
61	F	7.1	3.6	80.7	8.2	10.2
62	M	6.9	3.6	80.5	8.6	10.7
63	F	6.5	3.3	65.6	5.2	7.9
64	F	7.4	4.0	92.7	8.1	8.8
65	M	7.3	3.6	82.3	3.4	4.2
66	F	6.9	3.5	82.6	8.0	9.6
67	M	6.2	3.3	63.0	8.3	13.2
68	F	6.8	3.3	80.5	22.6	28.0
69	M	7.7	3.9	104.2	5.5	5.3
70	M	6.7	3.2	67.6	7.0	10.4
71	F	6.4	3.0	48.5	4.1	8.4
72	F	7.0	3.6	95.2	11.4	12.0
73	F	7.1	4.1	96.8	4.2	4.3
74	M	6.5	3.3	69.1	8.0	11.6
75	F	6.9	3.6	86.2	5.4	6.3
76	F*	6.9	3.4	71.6	2.6	3.7
77	M	7.6	3.5	88.9	8.5	9.6
78	F	7.2	3.7	90.3	9.6	10.6
79	F	7.4	3.7	95.9	7.8	8.1
80	F	5.9	3.0	58.3	3.9	6.8
81	M	7.2	3.6	85.1	4.5	5.3
82	F	7.2	3.5	96.5	4.6	4.8
83	M	7.2	3.4	73.9	4.6	6.3
84	F	7.8	4.0	101.0	9.3	9.2
85	M	7.6	3.5	102.7	5.4	5.2
86	F	7.6	3.8	92.8	6.9	7.5
87	F	7.6	3.4	97.9	9.5	9.7
88	M	6.3	3.1	69.3	3.7	5.3
89	F	6.7	3.5	75.9	5.5	7.2
90	M	6.4	3.0	64.4	6.8	10.5
91	F*	6.4	3.0	55.6	4.7	8.4
92	M	6.1	2.9	52.1	2.6	5.0
93	M	6.5	3.5	60.0	6.1	10.2
94	M	6.9	3.1	76.8	8.0	10.4
95	F*	6.7	3.6	72.2	4.6	6.4
96	F	6.5	3.4	75.1	8.0	10.7
97	M	6.2	3.2	64.5	6.8	10.5
98	M	7.1	3.7	79.2	3.8	4.8
99	F	7.5	4.0	90.1	10.0	11.1
100	M	7.1	3.4	84.6	12.6	14.9
101	F	7.0	3.2	83.6	7.1	8.5
102	M	6.5	3.0	63.4	3.6	5.7
103	M	7.4	3.7	88.2	7.8	8.8
104	F*	6.5	3.4	72.8	3.8	5.2

* Sex was confirmed histologically.