

GRAYFISH LIVER COLOR RELATED TO FIN-SPINE LENGTH

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In the examination of some 1,100 individual grayfish, it was found that the specimens with the blunter and more worn spines had the darker livers. Because dark livers generally average higher in vitamin A concentration than light-colored livers, this observation appeared to be of interest.

Spines are situated on the front edges of the two dorsal fins, each fin being protected by a single spine. As the grayfish moves about, the spines are subject to wear. While spines from young fish are usually sharp and in good condition, those from old fish are always worn and may even be broken off at the tips. The posterior spine, being larger than the anterior spine, was chosen for measurement as a matter of convenience. The length measured (the spines are bowed slightly) was the linear distance from the tip of the spine to the edge of the enamel at the base. Broken spines were discarded.



The specimens were classified according to sex, maturity, size, and liver color. The average length of the posterior spine was then determined for each of these groups, with the results shown in Table 1 (p. 7). The color of the liver was estimated by eye. The use of color comparators and photo-electric cells for this purpose was considered, but discarded as being impractical because of the conditions under which the measurements had to be made.

As can be seen from Table 1, there was a tendency for the spines to become progressively shorter (more worn) as the livers increased in darkness. Unfortunately, specimens were not available in all the groupings. Consequently, in taking averages to bring out the trend more clearly, only those values could be used for which comparable groupings were available.

The difference in spine length was most noticeable among the larger fish. Where small fish have been included in the groupings, as in the case of the males 36 to 85 centimeters in length and of immature females 36 to 65 centimeters in length, the trend is only slightly in evidence. Few specimens were available among the large males 91 to 95 centimeters in length, and none of them had a liver of a light color. No medium-dark or dark-colored livers were found among the large immature females 96 to 100 centimeters in length. However, the color groups which were available for the large fish show clearly that the fish with the darker livers have the shorter spines.

These observations can be interpreted in at least three different ways:

1. The fish with the darker livers might have spines which are less resistant to wear.
2. The fish with the darker livers might be more active.
3. The fish with the darker livers might be slower growing.

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A detailed study of this problem was beyond the scope of the investigation, but the most likely interpretation is that the difference in the wear of the spines is due to age. That is, for fish of the same sex and size, the fish with the darker

Table 1 - Liver Color and Spine Length in the Grayfish (*Squalus suckleyi*)

Length Groups--length of grayfish in centimeters	L I V E R C O L O R				
	Light	Medium Light	Medium	Medium Dark	Dark
MALES - AVERAGE POSTERIOR SPINE LENGTH IN MILLIMETERS					
36-40*	18 (2)	16 (4)	16 (2)	17 (2)	17 (2)
41-45*	18 (5)	18 (7)	21 (3)	19 (2)	18 (3)
46-50*	19 (5)	20 (11)	20 (10)	19 (3)	19 (2)
51-55	22 (4)	21 (9)	21 (11)	..	20 (1)
56-60	22 (3)	23 (10)	23 (11)	25 (1)	..
61-65	21 (2)	24 (10)	24 (13)	..	20 (1)
66-70*	27 (7)	25 (11)	25 (12)	23 (3)	30 (1)
71-75*	26 (4)	27 (15)	26 (28)	24 (5)	22 (4)
76-80*	26 (7)	27 (14)	26 (36)	26 (15)	21 (10)
81-85*	28 (1)	25 (9)	26 (48)	24 (27)	22 (28)
86-90	..	..	26 (31)	24 (31)	22 (26)
91-95	..	29 (2)	26 (10)	25 (11)	21 (15)
Average of Starred Lines	23.1	22.6	22.9	21.7	21.3
IMMATURE FEMALES - AVERAGE POSTERIOR SPINE LENGTH IN MILLIMETERS					
31-35	14 (2)	..	..	..	..
36-40*	17 (2)	17 (4)	16 (5)	22 (2)	16 (2)
41-45*	19 (3)	18 (9)	19 (5)	18 (7)	19 (3)
46-50*	20 (5)	19 (8)	20 (11)	20 (1)	18 (1)
51-55*	22 (2)	22 (15)	22 (9)	22 (1)	20 (2)
56-60	24 (5)	22 (12)	24 (11)	..	..
61-65*	25 (4)	25 (12)	23 (13)	25 (2)	17 (1)
66-70	26 (8)	26 (12)	24 (15)	..	..
71-75	27 (5)	28 (15)	26 (19)	..	24 (1)
76-80	28 (7)	30 (17)	28 (20)	..	..
81-85	31 (5)	29 (16)	28 (13)	..	..
86-90	30 (4)	30 (9)	31 (18)	26 (2)	..
91-95	34 (4)	31 (4)	30 (5)	..	..
96-100	42 (1)	35 (1)	30 (2)	..	..
Average of Starred Lines	20.6	20.2	20.0	21.4	18.0
MATURE FEMALES - AVERAGE POSTERIOR SPINE LENGTH IN MILLIMETERS					
76-80	..	25 (1)	25 (1)	..	..
81-85	..	..	..	..	..
86-90	32 (1)	..	28 (2)	30 (1)	22 (2)
91-95	32 (4)	32 (2)	30 (5)	..	25 (1)
96-100*	29 (4)	26 (2)	30 (9)	25 (3)	25 (1)
101-105*	33 (7)	31 (8)	31 (24)	31 (7)	23 (4)
106-110*	31 (8)	34 (3)	31 (16)	28 (14)	24 (7)
111-115*	35 (4)	32 (4)	29 (6)	28 (9)	26 (5)
116-120	30 (1)	..	29 (2)	28 (4)	..
121-125	..	..	..	31 (2)	..
Average of Starred Lines	32.0	31.8	30.2	28.0	24.5

*Starred groups are the only groups which included specimens in all five liver-color classifications.

NOTE: The numbers in parentheses indicate the number of specimens in each group.

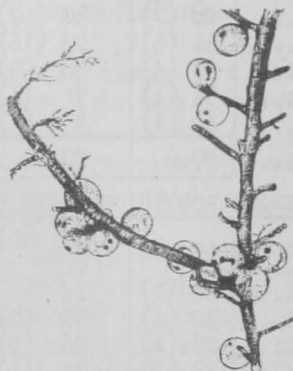
livers are probably the older, and their spines are blunter because the spines have been subjected to wear for a longer time. If this interpretation is correct, it might be expected that the difference in the length of the spine would be most noticeable among the larger fish, where specimens of the same size might have differed considerably in rate of growth. This is in agreement with the observations shown in Table 1.

If the last hypothesis is true, the phenomenon would seem to imply that liver color and vitamin A potency are associated with the rate of growth of the fish. That is, the darkest livers (and highest vitamin A potencies) are found in the fish that grow the slowest.



HERRING

Well known as the herring is, at various stages of its life it is called by other names that are less familiar. The so-called "sardines" that are canned on the coast of Maine are in reality young herring, which are caught in great numbers when they come inshore during the spring and summer. These young fish, 3 to 4 inches long, appear in enormous numbers off the coast of New England in the spring, usually arriving in Massachusetts Bay about the middle of April, and along the coast of Maine, the Bay of Fundy, and the west coast of Nova Scotia progressively later. Schools of young herring, ranging in size from 3 to 8 inches and including both one- and two-year-olds, usually may be found east of Penobscot Bay all summer. In July and August the sardine herrings of Massachusetts Bay are joined by schools of "sperling," the herring in their second summer that have grown to a length of 5 to 7 inches.



Herring eggs adhere to weeds, stones, or shells.
The dark eyes of the developing young are easily seen.

Although the one- and two-year-old herring, as well as the large spawning adults, are still numerous along the New England coast line during the early autumn, they move out into deep water soon after the middle of October, probably to winter on the bottom. During their third summer the young herring, still immature, grow rapidly and accumulate large amounts of fat among the body tissues. In Europe, large fisheries are based on these "fat" herring, but on our side of the Atlantic the herring in this state of development lie offshore more than do the younger fish, and so are less accessible to the fishermen. A few are taken by mackerel seiners, and stragglers come in along the Maine Coast.