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CHAPTER FIVE

BIOLOGY OF THE IMPORTANT SPECIES OF CATFISHES

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Information on the biology of the tachysurid catfishes from Indian waters is very meagre, and in the following account an attempt is made to compile all the published accounts and unpublished data collected from various centres on the biology of commercially important tachysurids of our waters.

AGE AND GROWTH

Tachysurus thalassinus : The age of this species have been determined by different methods, viz, length-frequency studies, using skeletal hard parts like pectoral spines, vertebrae and opercular bones as well as by rearing in the aquarium. Mojumder (1977), based on trawl data, estimated the growth of this species by the length-frequency method, and found that at Visakhapatnam, the fish attains an average length of 180 mm at the end of one year, 350 mm at the end of two years and 420 mm at the end of three years. Also utilizing the trawl data, Menon (1979) found that the species at Mandapam grows to 256 mm at the end of one year, 360 at the end of two years, 454 at the end of three years and 522 mm at the end of four years. He also determined the age of this species using skeletal hard parts like pectoral spine sections, vertebrae, and opercular bones, and the results obtained by these methods agreed closely with the results of the length-frequency studies. Rearing experiments conducted in aquarium tanks also showed similar growth values. The age-length data were used to estimate the growth parametres of the von Bertalanffy growth equation and the calculated values were in close agreement with those observed. The growth equation of *T. thalassinus* from Mandapam waters is $Lt=848.7\ [1-e^{-0.1988}(t-(-0.8113)]$.

Tachysurus tenuispinis : The age of *T. tenuispinis* was determined by length-frequency studies based on data collected from Visakhapatnam and it was estimated that the fish grew to 175, 237, 295, 355 and 395 mm by the end of 1.0, 1.5, 2.0, 2.5 and 3.0 years, respectively. Opercular bones were also utilized for the determination of age of this species and the back-calculated lengths at the time of formation of translucent rings were 111.6, 187.4, 246.4, 300.3, 357.0, 400.9 and 440.1 mm at the end of 0.5, 1.0, 1.5, 2.0, 2.5, 3.0 and 3.5 years, respectively. Similar results were obtained also when otoliths were used for the determination of the age of this species. The study showed that the growth rings in the opercular bone and otolith were formed twice a year, in June and December, and poor feeding might be the causative factor for the formation of rings. The von Bertalanffy growth equation was fitted to the age-length data and the calculated values were in close agreement with the observed ones. Hence, the von Bertalanffy growth equation of *T. tenuispinis* from Visakhapatnam (Dan, 1980) could be expressed as, $Lt=820\ [1-e^{-0.2108}(t-(-0.177)]$.

Tachysurus sona : Singh and Rege (1968) determined the age of *T. Sona* by length-frequency studies and found that the species grew to a size of 210 mm at the end of first year and 325, 450 and 510 mm at the end of years two, five and ten, respectively. They determined the age of this species by using vertebrae and the mean back-calculated lengths at ages 1 to 5 were 229.9, 315.6, 384.4, 417.0 and 454.0 mm, respectively. A close agreement was noticed between the observed values, based on the length-frequency data, and back-

TABLE - 1

Synopsis of the age and growth of Tachysurid catfishes from Indian waters

Method of age determination	Species	Lengths at ages (in mm)					Locality	Author
		I	II	III	IV	V		
Length frequency	*Tachysurus thalassinus*	250	370	450	522	—	Mandapam	Menon (1979)
Length frequency	*T. thalassinus*	180	350	420	—	—	Visakhapatnam	Mojumder (1977)
Pectoral spine	*T. thalassinus*	271	377	454	—	—	Mandapam	Menon (1979)
Vertebrae	*T. thalassinus*	260	355	440	—	—	Mandapam	Menon (1979)
Operculum	*T. thalassinus*	247	351	454	—	—	Mandapam	Menon (1979)
Von Bertalanffy growth equation	*T. thalassinus*	257	364	452	524	—	Mandapam	Menon (1979)
Length frequency	*T. sona*	210	325	—	—	450	Bombay	Singh and Rege (1968)
Vertebrae	*T. sona*	229	315	384	417	454	Bombay	Singh and Rege (1968)
Von Bertalanffy	*T. sona*	234	320	380	423	453	Bombay	Singh and Rege (1968)
Length frequency	*T. tenuispinis*	175	295	395	—	—	Visakhapatnam	Dan (1980)
Operculum	*T. tenuispinis*	187	300	401	—	—	Visakhapatnam	Dan (1980)
Otolith	*T. tenuispinis*	179	304	397	—	—	Visakhapatnam	Dan (1980)
Length frequency	*T. platystomus*	178	256	310	363	—	Mandapam	Menon (1984 b)
Vertebrae	*T. platystomus*	171	265	351	387	—	Mandapam	Menon (1984 b)
Operculum	*T. platystomus*	173	265	349	387	—	Mandapam	Menon (1984 b)
Von Bertalanffy growth equation	*T. platystomus*	177	272	340	388	—	Mandapam	Menon (1984 b)

calculated lengths from vertebral studies. The von Bertalanffy growth equation of *T. Sona* in Bombay waters could be expresed as:

$$L_t = 525.5\ [1 - e^{-0.3507\ (t-(-0.69))}].$$

Tachysurus platystomus:- Based on samples collected from Mandapam, the age of this species was determined by length-frequency studies, and it was found that the fish grew to a size of 171mm by the end of first year and 270 mm and 344 mm respectively by the end of the second and third years. Length-frequency studies by using probability plot technique also showed similar results, with 178 mm, 256 mm, 310 mm, 363 mm respectively at the end of the first, second, third and fourth years. The skeletal parts like vertebrae and opercular bones showed annual translucent rings, which were also utilized for the determination of the age of *T. platystomus.* From vertebral studies it was found that the species attained a length of 171 mm at the end of the first year and 265 mm, 351 mm and 387 mm respectively at the end of the second, third and fourth years. The opercular bone studies also gave similar results; the mean values of back-calculated lengths at ages 1 to 4 were 173 mm, 265 mm, 349 mm and 387 mm, respectively. The von Bertalanffy growth equation of *T. platystomus* was estimated to be

$$L_t = 497.5\ [1-e^{-0.35767(t-(-0.2305))}]$$

This relationship adequately describes the growth of *T. platystomus* in the Mandapam waters, since the calculated lengths for each age group derived from this equation were nearly identical with the mean lengths obtained by back-calculations based on skeletal parts and also with the mean lengths derived from length-frequency studies (Menon, 1984 b). All the available information on the age and growth of different species of tachysurid catfishes is given in Table 1.

LENGTH-WEIGHT RELATIONSHIP

Tachysurus thalassinus: Mojumder (1971) found no significant difference between the length-weight relationships of males and females of *T. thalassinus* from Visakhapatnam coast; he gave the equation as: $W = 0.009361\ L^{2.9689}$.

At Mandapam, the length-weight relationships were determined separately for the yolked larva, immature female, mature female and male, since there were significant differences in the slopes and elevations among these groups. The relationships for the four categories were:

Yolked larva : $W = 0.001769\ L^{1.788671}$

Immature female : $W = 0.000002434\ L^{3.224760}$

Mature female : $W = 0.000008973\ L^{3.009920}$

Male : $W = 0.000004855\ L^{3.089464}$

The values of the exponent 'b' were significantly different from the cubical relationships for yolked larva, immature female and male (Menon, 1979).

Tachysurus sona: Singh and Rege (1968) determined the length-weight relationship of *T. sona* from Bombay waters and the equation was:

$$\log W = -4.794868 + 2.932107 \log L$$

the correlation coefficient, $r = 0.9848$, being highly significant. They found that the relationship followed strictly the cube law.

Tachysurus dussumieri: The length-weight relationship of *T. dussumieri* from Mandapam waters was:

$$W = 0.0001047\ L^{2.647824}$$

the value of the exponent 'b' significantly diviating from the cubic relationship (Menon, 1979).

Tachysurus tenuispinis: The length-weight relationship of *T. tenuispinis* from two zones, the north (off False Point) and the south (off Visakhapatnam), and for different sexes were analysed separately and no significant differences was found in their regressions either for different zones or for different sexes. Hence, a formula common for both sexes and zones was worked out as:

$$W = 0.00001842\ L^{2.8860}$$

The value of the exponent was tested by 't' test and it was found that the cubic formula $W = aL^3$ does not hold good for the species (Dan and Mojumder, 1978).

RELATIVE CONDITION FACTOR

Tachysurus thalassinus : Among mature males and females of *T. thalassinus,* low values of the Relative condition factor (k_n) were observed during the months of April to August, which had coincided with the breeding season of the species. Similarly, low values of K_n were noticed at 290 mm, which could be correlated with the size at first maturity; the subsequent falls of K_n at 360—370, 450—460 and 510mm may be indicative of spawning at the second, third and fourth years, respectively (Menon, 1979).

Tachysurus sona : Singh and Rege (1968) found that the variations in the K_n values of *T. sona* at sizes 240mm, 345mm, 475mm, and 525mm correspondingly representing the spawnings at ages 2, 3, 4 and 5 years.

Tachysurus tenuispinis : Dan (1977) observed an increase in the K_n value of *T. tenuispinis* of Visakhapatnam up to May, followed by a steep fall in the subsequent months, which indicated the spawning. The K_n values in relation to size showed three peaks, at 275mm, 335mm and 400 mm.

Tachysurus platystomus : Among the mature fishes of *T. platystomus* a lowering of K_n value was observed in the months of December, January and February, which being the breeding seasons of the species. The fall of K_n value at sizes 290 mm, 350 mm, and 380 mm represented the first, second and third spawnings at age 2, 3 and 4, respectively (Menon 1984 b).

FOOD AND FEEDING HABITS

Estimates of the quantity and quality of food organisms in the given area would not only indicate the possibility of fish concentrating in these feeding grounds but also furnish at the same time, such information as the growth phase of fish moving into these grounds. It is well established that the qualitative and quantitative composition of the food of a species is essential to understand many aspects concerning the fish, such as migration, behaviour and growth. All the available information on the food and feeding habits of the techysurid catfishes from Indian waters is summarized in Table 2.

Tachysurus thalassinus : Chacko (1949) had examined the stomach contents of *T. thalassinus* from the Gulf of Mannar and reported that the species was omnivorous. Suseelan and Nair (1969) stated that *T. thalassinus* was a carnivore and that the main food comprised organisms from the bottom epifauna and infauna, along with fishes. Mojumder (1969) studied the food of *T. thalassinus* from Visakhapatnam and found that 67% of the food consisted of crabs, prawns, *Sqilla* sp. and other crustaceans, 22% teleosts and 4% molluscs. His observation showed that the larger (36 cm and above) catfishes had low feeding intensity, which has been correlated to the breeding cycle. Menon (1979) made a detailed study on the food and feeding habits of *T. thalassinus* from Mandapam and reported that the species was a voracious carnivore. Fishes from Palk Bay fed mainly on echiurids, polychaetes, crabs, prawns and other crustaceans and bottom and column fishes. On the other hand, fishes from the Gulf of Mannar fed on crabs, prawns, *Philine* sp , ostracods, amphipods, alpheids and fishes. Variation of food in relation to size showed that the smaller size groups ate polychaetes, amphipods, ostracods and other smaller crustaceans and their diet was restricted to a few items from the bottom epi - and infauna; whereas the larger fish (1-and 2-year olds) fed on a variety of crustaceans and fishes, both from the bottom and column waters. Still larger fish ate larger crustaceans and fishes. In short, the immature fish were purely bottom feeders (on a narrow food spectrum), but the mature fish frequently visited the column waters for a more varied diet. The feeding intensity was low during the breeding months of April and August in the case of mature fish. The yolked larvae, while in the parent's mouth, supplemented their diet by small planktonic organisms that get into the male's mouth along with the respiratory incurrent.

TABLE - 2

Synopsis of the food and feeding habits of tachysurid catfishes of India

Species	Major food items	Feeding intensity and habits	Locality	Author
Tachysurus thalassinus	Fishes and algae	Omnivore	Gulf of Mannar	Chacko (1949)
,,	Sea-cumcumber, cuttle fish, small crustaceans, amphipods; prawns, crabs, worms and small fishes.		West coast	Devanesan and Chidambaram (1953)
,,	Crabs, fishes, prawns, stomatopods, polychaetes and slaps	Carnivore and partial scavenger	Bombay	Suseelan and Nair (1969)
,,	Crabs, prawns, *Squilla* sp. and demersal fishes.	Larger fish (36 cm and above) have low feeding intensity during April-August, Carnivore	Waltair	Mojumder (1969)
,,	Echiurids, crabs, prawns, stomatopods, polyachaetes and fishes (Palk Bay); *Philine* sp., crabs, alpheids, prawns, ostracods, amphipods and fishes (Gulf of Mannar)	Low feeding intensity during April-August. Small fishes are true demersal feeders and larger fishes are demersal and column feeders.	Mandapam	Menon (1979)
T. dussumieri	Spine shells and *Dentalium* sp.		West coast	Devanesan and Chidambaram (1953)
,,	Polychaetes, ophiurids, bivalves and sea weeds.	Omnivore	Calicut	Venkataraman (1960)
,,	Bivalves, crabs, amphipods, polychaetes, brittle stars and teleosts.	Carnivore, bottom feeder	Bombay	Suseelan and Nair (1969)
,,	Echiurids, crabs, prawns, *Squilla* sp. and fishes	Carnivore	Mandapam	Menon (1979)

1	2	3	4	5
T. jella	Molluscus, *Lucifer*, crabs, prawns and small fishes.		West coast	Devanesan and Chidambaram (1953)
,,	Anemones, polychaetes, crabs, amphipods, stomatopods, bivalves and gastropods.	Omnivore active feeding during night	Bay of Bengal	Rao (1964)
,,	*Squilla* sp., prawns and bivalves (*Arca* sp.)		Bombay	Suseelan and Nair (1969)
T. platystomus	Crabs, echiurids, prawns, *Squilla* sp. and demersal fishes (Palk Bay)	Low feeding intensity during November-January. True demersal feeders. Carnivore.	Mandapam	Menon (1984 b)
	Crabs, prawns, *Squilla* sp., polychaetes, molluscs and echiurids. (Gulf of Mannar)			
T. tenuispinis	Crabs, prawns, *Squilla* sp., polychaetes, molluscs and echiurids.	Low feeding intensity during June-July.	Waltair	Mojumder (1981)
T. caelatus	Echiurids, crabs, fishes, prawns and polychaetes	Carnivore	Mandapam	Menon (1979)
T. serratus	Crabs, prawns, echiurids, alpheids, squids and fishes	Small fishes feed on the bottom and large fish feed both in bottom and column.	Mandapam	Menon (1979)
Osteogeneiosus militaris	Brittle stars, crabs, polychaetes, molluscs and whitebaits.		West Coast	Devanesan and Chidambaram (1953)
,,	Polychaetes, molluscs, crabs, prawns and brittle stars.	Bottom feeder.	Calicut	Venkataraman (1960)

Tachysurus dussumieri : Venkataraman (1960) and Suseelan and Nair (1969) studied the food habits of *T. dussumieri* from Malabar and Bombay waters, respectively. Menon (1979) reported that *T. dussumieri* was essentially a carnivore, feeding on the bottom epi-and infauna, though the larger size-groups appeared on the surface and fed on fishes. They fed mainly on echiurids, crabs, prawns, *Squilla* sp. and fishes. Juveniles up to a size of 12 cm mainly fed on polychaetes of the species *Diopatra variabilis* and *D. neopolitana*. Larger size-groups ate larger crustaceans, squids and fishes.

Tachysurus platystomus : This species is purely a bottom feeder, feeding on the bottom epi- and infauna. The yolked larvae of this species were found to supplement their diet by planktonic organisms like nauplii, alima and copepods, even while they were in the parent's mouth. The immature fish from the Gulf of Mannar fed mainly on polychaetes (12 to 50%) and *Philine* sp. (12 to 50%); other important food items were amphipods, prawns, crabs and ostracods. Fish from Palk Bay ate echiurids (16 to 40%), polychaetes (17 to 63%) and prawns (4 to 20%). The major food items of mature fish from the Gulf of Mannar were *Philine* sp. (14 to 40%), crabs (10 to 25%), *Squilla* sp. (10 to 20%), prawns (3 to 20%) and alpheids (4 to 23%). On the other hand the food components of the mature fish of Palk Bay were echiurids (2 to 35%), *Squilla* Sp. (14 to 22%), prawns (5 to 24%) and crabs (7 to 13%). High percentage of empty stomachs were observed during November to February, the breeding period of the species. Unlike many other species of the family Tachysuridae (Menon 1984 b), all the size groups of this species fed on the bottom fauna.

Tachysurus caelatus : A study on the food habits of *T. caelatus* from Mandapam waters showed that the species was a voraceous carnivore; the main food organisms encountered in the stomachs were echiurids, crabs and fishes. The Juveniles of this species fed mainly on the bottom fauna like *Diopatra variabilis*, small crabs and echiurids; while the larger size-groups preyed upon a variety of prawns, comprising the species *Penaeus semisulcatus*, *Metapenaeus affinis* and *Parapenaeopsis tenella*, and crabs, echiurids and column fishes (Menon 1979).

Tachysurus jella : Devanesan and Chidambaram (1953), having analysed the stomach contents of *T. jella*, reported that they fed on mollusca, lucifer, crabs, prawns and small fishes. Suseelen and Nair (1969) found that the species fed on *Squilla* sp., prawns and bivalves. Rao (1964) reported that *T. jella* was an omnivore, feeding actively during night and that the species was an exclusive bottom feeder, crabs, prawns and other crustaceans constituting the bulk of the food during night.

Tachysurus tenuispinis : A study on the food spectrum of this species had shown that they were essentially carnivores, feeding on the bottom and, at times, also on midpelagic fishes and squids. They fed mainly on crabs, prawns, *Squilla* sp. and other crustaceans. The crustacean food formed 37%, polychaetes 26%, molluscs 6.5%, teleosts 6.3% and echiurids 4.2% of the total volume of food components. As a single item, polychaetes appeared preferred. Low feeding intensity was observed during June-July, correlated with the breeding season (Mojumder, 1981)

Tachysurus serratus : The major food items of *T. serratus* from Mandapam waters were crabs, prawns, echiurids, *Squilla* sp., alpheids, squids and fishes. The smaller size-groups were true demersal feeders and the large fishes moved up the column waters for a more varied diet consisting of larger food components (Menon 1979).

Osteogeneiosus militaris : Devanesan and Chidambaram (1953) and Venkataraman (1960) had studied the food of this species and reported that they were bottom feeders, feeding mainly on polychaetes, molluscs, cuttle fishes, crabs, prawns and brittle-stars.

REPRODUCTIVE BIOLOGY

The present information on the breeding biology of tachysurid catfishes from Indian waters in relation to time, place and pre-spawning developmental changes of the gonad is very scanty. The only published accounts

are on the development of *T. Jella* by Chidambaram (1942) and on the size of eggs collected from the mouths of gestating males of *T. caelatus* by Sekharan and Mojumder (1973). Pantulu (1963), Dan (1977), Majumder (1978) and Menon (1979 and 1984 a) have given detailed accounts on the breeding biology of a few species of tachysurids from Indian waters.

The nature, function and distribution of ova in the different regions of the ovary of tachysurid catfishes showed significant difference from other teleostean fishes. In the mouth-breeding tachysurid catfishes, there were three groups of ova in the ovary with different nature and function. In a ripe ovary, of the three groups of ova, designated as 'a', 'b', and 'c, the first was comparatively small, non-yolked and translucent, occupying the oviducal region of the ovary; the 'b' ova were also non-yolked, translucent, and frothy in nature, occupying the posterior conjoined region of the ovary; whereas the 'c' ova were yolked, opaque, occupying the rest of the ovary (Plate 1 H). The first two groups were reproductively non-functional where as the last group alone was reproductively functional. At the time of spawning, the groups 'a', 'b' and ripe 'c' ova were extruded in a bunch (Menon, 1984 a). Details of the reproductive biology of some species of techysurids are given in Table 3. A breeding calender for Indian tachysurids is given in Fig. 1 to show the spawning season of various species.

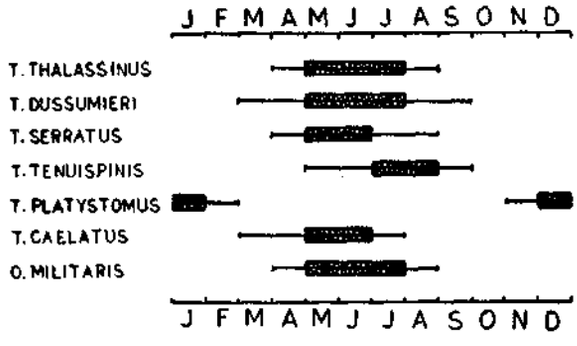


Fig. 1 Breeding calender for the tachysurids

Tachysurus thalassinus : A detailed study on the ova-diameter frequency of *T. thalassinus* from Mandapam waters had shown that there were three modes in the group 'c' ova, which were at 2.2 mm, 3.7 mm and 14.2 mm. Since there was only one batch of mature ova that was widely separated from the maturing groups, it was evident that the species spawned only once, in a short, restricted period. Even though the spawning period of individual fish was short, and only once a year, the appearance of gestating males, ripe females and juveniles over a long period of time had suggested that the population as a whole might breed over a prolonged period, with the peak breeding period from April to August. Females of *T. thalassinus* were found first to mature (stage III) at a size of 28–30 cm and male at 26-28 cm in total length. The males first spawned when they completed one year and females when they were two years old and there after every year as in males. The maturity-maximum-length relationship of the species was found to be 0.3231 for males and 0.3419 for females; this low value, of $L\infty$ / Loc perhaps indicating a low mortality (M) rate for this species (Beverton and Holt, 1957). The fecundity varied from 31 ova in a fish of 378 mm to 60 ova in a fish of 450 mm in total length. The relationship between fecundity and fish length may be expressed by the equation, log F=1.9332+ 1.3581 log L, the correlation, coefficient 'r' = 0.7059. The fecundity-fish-weight relationship may be expressed as, log F=0.3352+ 0.4524 log W and the 'r' value calculated at 0.7231. The values of the exponent in both the above relationships show that the fecundity increased at a rate less than length-weight relationship. The immature (stages I and II) fish had a gonadosomatic index of 0 to 0.1, 0.1 to 0.9 for early mature fish (stage III) and 0.9 to 14.3 for late-mature and spent (stage IV-VII) fish. In the peak breeding months, April to August, high values of G.S.I. were observed. In the larger size groups the females were outnumbered by males and during the breeding months, equal number of males and females were noticed in the catches. (Menon, 1979).

Mojumder (1978) found that off waltair coast this species breed once a year, from April to August, with peak in May–July. The size at first maturity for females was 36 cm and the fecundity varied from 25 to 42 ova.

Tachysurus dussumieri : Menon (1979), based on the ova-diameter-frequency polygon of *T. dussumieri* from Mandapam waters, observed

two widely separated distinct modes in the ripe ovary for the group 'c' ova, at 4.5 mm and 13.5 mm. The second group of gravid ova along with non-functional 'a' and 'b' ova seem to get extruded once a year during March-July in Mandapam waters. The fecundity was estimated to be 108-165 ova in fish ranging from 580 to 625 mm in total length.

Tachysurus tenuispinis : The species was found to breed only once a year, during May to September, with peak in July-August. The size at first maturity was 275 mm for both males and females. The fecundity varied from 29 to 82 in fishes ranging from 285 to 424 mm. The females dominated in the commercial catches and the male: female ratio was 1:1.79 (Dan, 1977).

Tachysurus caelatus : The ova diameter study on the functional group 'c' ova showed two distinct widely separated modes in a ripe ovary, at 3.5 and 11.5 mm. The spawnings of the individuals was found to take place once a year, over a short period of time. However the occurrence of spent female and gestating males over a long period of time suggests that the population as a whole might breed over a protracted period from March to August (Menon, 1979). Sekharan and Mojumder (1973) found three different groups of eggs in the mouth of the gestating males of *T. caelatus* with distinct modes at 11.13mm, less than 6 mm and 0.04-0.16 mm (appearently of groups 'c', 'b' and 'a' ova referred to earlier).

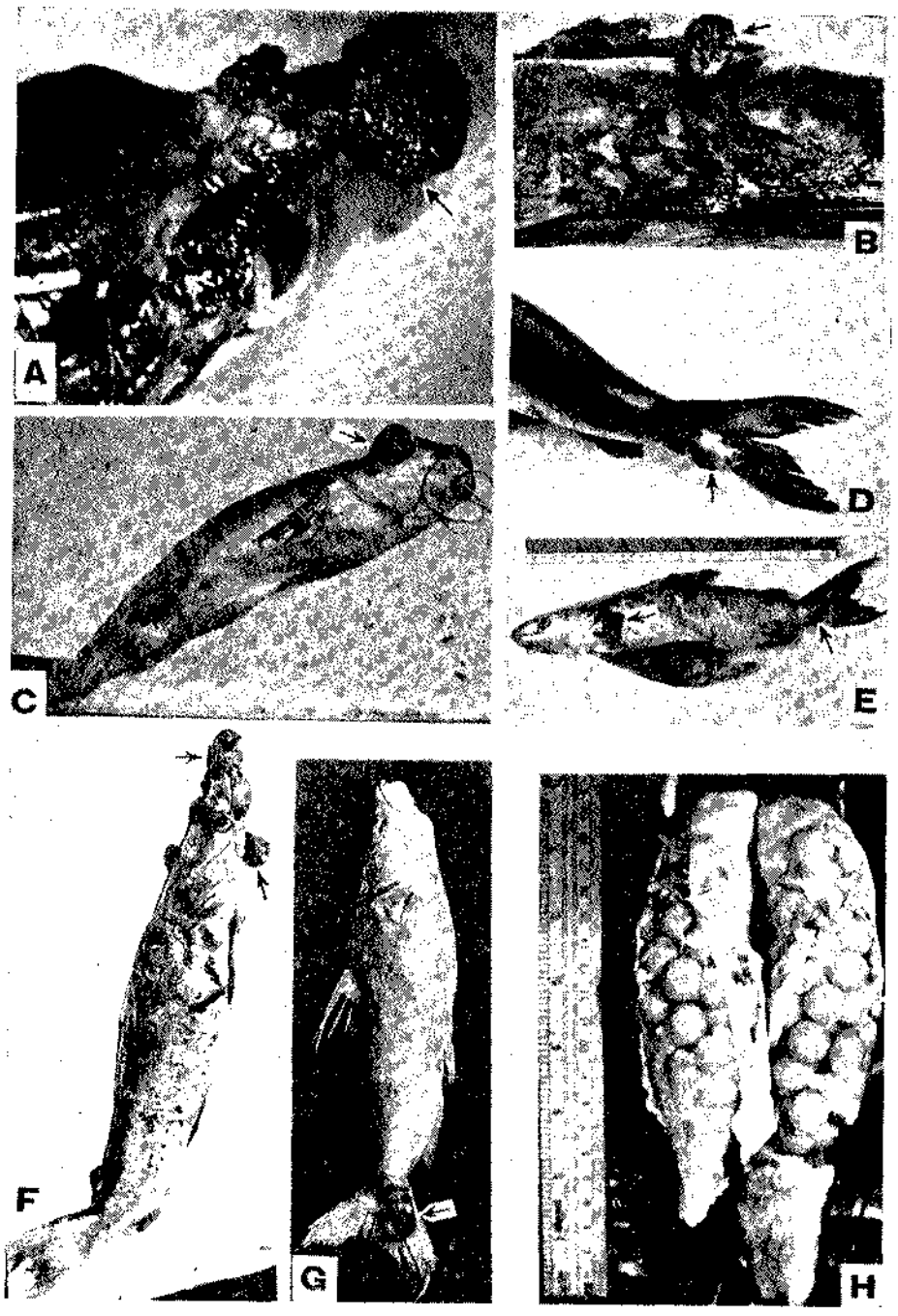
Tachysurus platystomus : The ova-diameter-frequency polygon of *T. platystomus* showed two distinct modes in the ripe group 'c' ova at 2.5 and 11.5 mm; the species spawning only once a year, in a short period of time, from November to February. The females appear first to mature at a size of 230 mm and males at 220 mm. The fecundity varied from 32 to 45 ova in fishes of 230 to 393 mm in total length. Males were numerous in the catches during the breeding season (Menon, 1984 b).

PARENTAL CARE

The low fecundity of the species of techysurids is usually compensated by the low rate of egg/larval mortality due to the type of parental care involving buccal incubation, common in all the species of the genera *Tachysurus* and *Osteogeneiosus*. When the female attains maturity, the pelvic fins get modified by way of enlarging the tissues on the first inner fin-ray. This modification of the pelvic fins reaches its culmination in the ripe stage; and then the fins get enlarged and broadened. Lee (1937), Hardenberg (1935), Gunter (1947), Balon (1975) and Menon (1979) suggested that probably these modified pelvic fins assist to transfer the spawned eggs to the mouth of males. As a preliminary to receive spawned eggs, the ripe males show some modification in the oral cavity. The volume of the oral cavity gets increased and the oral mucosa secretes more mucus, which acts as a cushion for the developing young ones. This mucus coating of the oral cavity of the parent protects the young ones from the sharp teeth in the palatine and upper and lower pharyngeal tooth plates (Oppenheimer, 1970). In all the species of tachysurids, the male carries the brood in the mouth. The period of gestation is two months in the case of *Arius jella* (Chidambaram, 1942) and one month in the case of *T. thalassinus* (Menon, 1979). The larvae remain the parent's mouth till the whole yolk get absorted.

PARASITES

Menon (1979) reported occurrence of a copepod parasite, *Caligus dakari* Van Benedon, in the buccal cavities of *T. thalassinus* and *T. dussumieri* from Mandapam waters. The infestation was maximum during September-January period. As high as 9% of the fish examined during December showed the presence of this parasite in *T. thalassinus*. *Hermilius pyriventris* Heller was found to infest the gill filaments of *T. thalassinus* and *T. platystomus* and their percentage of incidence was high in October-December period. Pillai (1962) reported the occurrence of *Hermilius longicornis* Basett and Smith from the gill filaments of *T. dussumieri* and *T. acutirostris*. Pillai (1961) recorded the occurrence of *Lepeophtheirus Longipalpus* Basett and Smith in the buccal cavity of *T. dussumieri*. A few specimens of *T. thalassinus* from Mandapam and Tuticorin (Gulf of Mannar)



Figs A—G. *Different types of tumours* (Papilloma, Osteoma, Osteochondroma) different parts of *T. tenuispinis* (see arrows)

Fig. H. Ripe ovary of *T. tenuispinis* showing both functional and non-functional ova.

were found to be infested by a new species of myxosporidian sporozoan, *Henneguya tachysuri*. The cysts of the parasite were found in the subcustaneous muscles and were easily spotted by external bulges in the skin (Menon, 1984 c). The occurrence of various forms of tumours noticed in tachysurid catfishes is also worth mentioning. Selvaraj *et al* (1973) reported the occurrence of osteochondroma and osteoma in *Tachysurus jella* from the southwest coast of India. In this species the skin, bone and fins were affected by tumours of different sizes, sometimes as large as 45 mm diameter. Menon (1975) noticed buccal papillomas in the floor of the buccal cavity of *Tachysurus platystomus*, particularly in females, from the Gulf of Mannar; the size of the tumour varied from 3 to 10 mm. Different types of tumours (papilloma, osteoma, osteochondroma) of various sizes and forms were recorded from *Tachysurus tenuispinis*, almost round the year, from Calicut during the years 1979-1985 (Plate 1 A-G). The osteomas were very common in this species affecting almost all skeletal parts of the fish including fin rays, vertabrae, etc. The tumours occur irrespective of sex and gonadial conditions.

Table - 3

SYNOPSIS OF THE REPRODUCTIVE BIOLOGY OF A FEW SPECIES OF TACHYSURIDS FROM INDIAN WATERS

Species	Locality	Methods of study	Frequency of spawning	Spawning Season	Fecundity	sex ratio M : F	Reference
T. thalassinus	Mandapam	Ova diameter Relative condition factor, Gonado-somatic index	Single spawning	April-August	31-60	1 : 1.08	Menon, 1979
,,	Waltair	Ova diameter	,,	April-August	25-42	1 : 1	Mojumder, 1978.
T. dussumieri	Mandapam	Ova diameter	,,	March-July	108-165		Menon, 1979
T. tenuispinis	Waltair	Ova diameter	,,	May-September	29-82	1 : 1.79	Den, 1977.
		Ova diameter	,,	November-February	32-45	1 : 1.12	Menon, MS
		Relative condition factor					
T. caelutus	Mandapam	Ova diameter	,,	March-August	30-70		Menon, 1979.
T. platystomus	Mandapam	Ova diameter	,,	November-February	32-45		Menon, 1984 b
Osteogeneious militaris	Hooghly estuary	Ova diameter Relative condition factor	,,	March-May	40-110		Pantulu, 1963.

CHAPTER NINE

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