On the Fish-Fauna of the Lower Nile.

presented as Thesis for the Degree of Doctor of Science in Zoology.

by

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The desire to establish priority to some extent, facts relating to certain fishes of the Nile has induced me to issue a preliminary notice of my research on the Fish Fauna of Egypt, which has been engaging my attention for the past few years.

So far my collecting has been confined to what might be termed the Lower Nile, that portion of the river, W. of Assuan, including the branchless water lakes connected with the river by irrigation canals. I have obtained somewhat less than half the number of species described from all parts of the river. To these I must add two new species, descriptions of which I publish in this communication for the first time.

The collecting of fish in Egypt is beset with much difficulty. The fishermen, as a class, are 

The present paper will, in addition to a description of the new species, include a summary of my notes on Nile fishes, which, although incomplete, I now take the liberty of publishing, and also a short account of the fisheries of Egypt.
Fishing is carried on by professional fishermen in all parts of Egypt, in the rivers, in the irrigation canals, large and small, in the pools in birkets, permanent or temporary, left by the receding waters of the Nile, in the large lakes on the Mediterranean littoral, in Birket el-Kerroum in the Fayum province. Every town or large village has its market for the sale of local caught fish. There are in the provinces who cannot refer a common Nile fish to its Arabic name. Fish then are identified. Government derives a large revenue from its fisheries. In most instances the right to fish is let to a tenant who extracts from the fishermen one third to one half of the proceeds of the sale of his catch. At Lake Menzala, however, Government holds the right to receive a part of all fish taken from certain parts of the lake, giving to the fishermen half of what is received for their fish in Lake Menzala and the other Lakech water lakes connected with the sea. Marine fish are naturally found in those which communicate with the Nile through canals. There is an intermingling of marine and freshwater forms. Taking Lake Menzala as a type of the latter class of lake, it is noticeable that all the species of fish occurring in that part of the river from which the lake derives its freshwater are not found in lake itself or the relative
abundance of species found in both situations differs considerably. Certain fish, e.g. *Chromis*, seem more suited to a life in salt water than others, such as *Labeo*. (A specimen of *Chromis bahiense* in my possession was obtained from the Suez Canal in an apparently healthy state.) *Labeo* is found in the lake in some quantity after the influx of water from the flooded river in the months of August and September, rarely and near the mouths of fresh-water canals at other seasons of the year. Amongst the *Siluridae*, out of the genera *Bagrus*, *Clarias*, *Pseudobagrus*, *Schilbe*, all of which occur in the lake, *Clarias* exceeds the others in front of numbers, while in the river this condition of things is reversed. The above-named genera, excluding *Labeo*, are perhaps the only ones whose instincts (predatory in most cases) lead them to enter the lake. Other forms, e.g. *Labeo*, *Malapterurus*, *Alestes*, etc., are caught at the period of high tide only or during the conditions mentioned previously in the case of *Labeo*, so that their occurrence in the lake is to be regarded as accidental. And *Mormyridae* have never, to my knowledge, been taken from Lake Mehrizaleh, or from any of the other referred to.

*Chromis* and *Clarias* are the commonest genera of freshwater fish met with in these lakes. |250| tons of the two
Virginia species of *Chromis* were taken from Lake Inverness in the neighborhood of Damascus in the space of four days. Both species of *Chromis* spawn in the lake as I have captured species of *Clarias* with ripe ovaries there. It is very probable that Lake Inverness is one of their breeding places also. Birket-et-Tawil is a brackish lake situated in a depression of the Libyan desert on the western margin of the Fayoum province. It receives the overflow of the Bahr el-Yousef, a large canal which supplies the province with water and also drainage water from the cultivated land. *Chromis*, *Clarias*, *Bagrus*, and *Lake* are the predominating genera found in it. The *Mormyridae* are absent here as in the other brackish lakes. A noteworthy fact in connection with this lake is that the species of the genera mentioned attain to a much larger size than their fellows in the river or in any part of the Lower Nile system. *Chromis* varieties of over 50 cm long are common. Specimens of *Lake* are frequently caught measuring 150 cm or more. The abundance of large-sized fish caught in this lake may be traced to the fact that the lake is not overfished. Difficulty of transport renders any but a local sale of the catch impossible. Prof. Schweinfurth of Berlin, who is well acquainted with the geological formation in this neighborhood, has suggested to me in this connection that the
configuration of the limestone rocks forming the bed of some parts of the lake may shield the fish from the toils of the fishermen.

In the canals of the country, Chromis, Lates, Barbus, Alestes, Pterycusio, genera. ally, are the fish usually met with, but in the "baskets" any of the fish species may be obtained, as, with the overflow of the river, fish which would not of their own accord leave the channel of the Nile, and others are swept out one the cultivated land of the ancient irrigation basins. When the water rehea. pools of greater or smaller extent are left which may or may not be permanent depending on their depth. The shallows, pools soon dry up & these petty inhabiti. ants fall prey to the peasants & birds and water fowl or are left as a deposit on the dried mud. The larger & deeper baskets, many of them of considerable extent, would naturally form the rearing points of the mulberries of fry which they contain, were it not for the insatiability of the fishermen who thoroughly & rapidly deplete them of all fish life.

The machines of capture employed by the native fishermen are : — "po t " breaks baited & unbaited. When bait is used it is either fish fry ("fascia") or a paste made from sesame seed, germinated barley seed, and fruits, eggs. These are rarely used on account of their
scarcity. The hooks, which are large sized, are attached at intervals of a metre or so along a bottom line which is weighted at each extremity. It is fitted with floats of empty gourds or inflated goat stomachs. The lines are set usually in the early morning, and picked up two hours later. The species most commonly taken by this means are Anguilla, nearly all Silurid fish, large specimens of Morone carpio, catfish, Paramblyodon. In swift flowing parts of the river and in shallow portions of the large takes the method of fishing with naked hooks is often used. With effect. At intervals along the head line are fastened snoods carrying hooks which are larger than those used in the method just described. A piece of cork is attached to each snood close to where it joins the head line. Together with these pieces of cork, buoys and weights at the extremities of the head line maintain the hooks in the water a short distance from the bottom. If there is a strong current in the part to be fished the line is shot across the current, and fish in swimming with or against the stream run the risk of being caught in the snoods. Specimens of large fish are sometimes seen in the markets bearing wounds which could only be inflicted in this way. In shallow waters the method of procedure is different. Several lines are set at a short distance from, and parallel to, each other.
The fishermen then enter the water and drive the fish through the rows of hooks by beating the water with sticks or by making a din with petroleum tins. The method of using unbaited hooks is not only cruel but wasteful as many fish escape with wounds which ultimately cause their death. 2nd nets. The principal forms of nets used are the casting net ("trabia") or the seine ("grappa"). The first is made of cotton or hempen twine, it is conical in shape with a closed apex. The free margin of the net is turned in 4 attached to the sides by cords at intervals of 40 centimeters. A hem is thus formed which is practically open and admits of the entrance of even large-sized fish. Small pieces of lead are fastened to the free turned edge. The diameter of the net varies as does also the size of mesh. The diameter of a net for capturing small fry may be 6 metres or more, the mesh 5 centimeters between the knots while for large fish a heavier net of larger mesh 2 consequently of smaller size must be employed. Two varieties of this net are in use: one in which the apex of the cone is attached directly to a rope. In another, while a ring of wood is let into the apex of it a rope passes terminally inwardly in many subdivisions each of which are attached at intervals round the circumference of the net. The process of
Being it is as follows. It is manipulated by one man. The terminal portions in length according to the depth of water in which the net is to be used. It is coiled loose fashion on the fingers of the left hand. When the net is reached it is folded zigzagwise over the extended palm of the same hand till the folds round the circumference begin to leave the ground. The folds are then transferred to the right hand and are grasped firmly. A portion of the free margin of the net nearest to the fisherman is hitched over the right elbow, which is held about the level of the shoulder. The left hand, still holding the rope passes both of the margins nearest to it. Now the fisherman is ready to throw a swing of the body and a corresponding motion of the right arm & the net is launched through the air to a distance varying with the requirements or dexterity of the thrower. When it touches the water it will, if well thrown, describe an almost perfect circle. The leads round the margin will carry it rapidly to the bottom. The end of the lead rope remains in the hand of the fisherman who as soon as the bottom is touched begins to haul the net towards him making the long axis of the cone move at as an acute an angle as possible with the bottom. If any fish should be enclosed in the cone they find that escape is impossible for the weighted
margin with its hem is never allowed to leave the bottom till the opposite sides of the net are in contact, when the whole is hauled ashore or on to the deck of the fishing boat. The same procedure is followed in the case of the second variety of this net, the only difference being that a larger bag is formed for the accommodation of the catch by the head rope being directly connected with the circumference of the net. The casting net is used in the river, & in the lakes, in deep or in shallow water. A number of men will sometimes cooperate to fish a small bucket. Each man provides himself with a raft of petroleum tins, & the company proceed to drive the fish towards one end of the piece of water. At a signal, several casting nets will be thrown as almost as close as possible the water into which the fish have been driven, & the work of extermination goes on till the catch does not pay the trouble of fishing.

The seine net is identical with that employed in this country, & it is used with great effect in the shallow waters of the country. The size of the mesh varies with the size of fish to be caught.

A modification of this net is used by the mailer fishermen & has already been described in the papers on edible fishes of Lake Pemzaleh, etc.
not so commonly as those just described. At Birket el Helu a form of trout net is used for the capture of large fish. It consists of an H-shaped pouch of strong twine with the usual arrangement of floats and weights to keep the mouth open. Two boats are required to work it. A modification of a net often depicted in Chinese ornaments is used in some parts of Egypt. The apparatus consists of the V-shaped branch of an Acacia cut so as to leave only a short supporting link. A light cotton net is bent to the limbs of the V and to a rope joining their extremities in such a way that it hangs close to the fork. This looseness is so great as to form a bag-like structure. One man only is required to work it. With the lower limb of the V between his legs, grasping the diverging limbs a little distance from the fork, he advances, keeping the extremity of V on or near the bottom, now again raising the net out of the water, when if he is successful the fish struggle backwards into the bag in front of him.

The net is more commonly seen in Upper than in Lower Egypt. The middle left in the land after the irrigation of a "basin" an eddy in a shallow part of the river, or a shallow irrigation canal are favourite localities for the employment of this machine.

Another curious instrument is a
Wicker cage shaped like the well known lobster pot but minus a bottom. It is about 
1 metre high & a little less in diameter. It is carried in the hand of the fisherman 
who confines his attentions to shallow 
canals or mud banks on the river. While 
walking at every alternate step or so he 
brushes it rapidly to the bottom in front 
of him. If the capture of a fish is signalled 
by it clashing against the side it escapes 
this method is rather local & I have 
only seen it practiced in Upper Egypt. 
In the backwaters of the river & in other 
places overgrown with reeds it is 
the only practicable method as the presence 
of reeds precludes the use of any form 
of net.

In the following pages I propose to enter 
the summary of my observations on Nile 
fishes. There still remain many blanks 
to be filled in both as regards species 
which have not yet been observed by me 
or also the natural history esp. the breeding 
habits of most of the species already in 
my collection.

Later mention a fish which was well 
known to the Ancient Egyptians can 
readily be recognised in the mummified scenes 
on the stelas & walls of the early Egyptian 
tombs. That it was reverenced by the Egyptians 
There can be no doubt as specimens 
of the mummified fish are obtained 
from the site of an ancient town, 
bearing the Greek name Latophis from
I have found it throughout the
lower Nile. In the river itself it is not at all
common, and specimens are not of everyday
occurrence in the markets. Bukata, however,
is famous for its large-sized fish. Specimens
the height of a man in length are said to
be common, but I have never obtained a
confirmation of St. Helene's statement that it
grows to the length of 60 feet. The largest
specimen I have seen possessed the following
measurements:—Length over all 15.8 c.m.
Depth at 1st dorsal spine 4.35 c.m.
Circumference (greatest) 11.8 c.m.
Weight 54 kilos.

Longest diameter of a scale
of the lateral line 4 c.m.

In this and other large-sized specimens
of individuals I have examined, the spines
on the preoperculum and postpectoral are as a
rule, feebly developed in comparison
with those on a smaller fish. In one large
specimen all the spines, with the exception
of that at the angle of the preoperculum
were represented merely by undulations.
It would appear that the fish this species
is extremely susceptible to cold. At Cairo
on 9th Jan. 85 the mercury fell to 0°
as a thin pellicle of ice formed on the
surface of standing water. As a consequence
of this low temperature, later in all size
were found floating dead on the surface
of some shallow ornamental ponds
near my house. No other fish seemed
to be thus affected by the cold, and the
Phenomenon was unique in the experience of the oldest natives. The flesh of the Nile perch is considered a delicacy by the Arabs. Certainly, the flesh of aspic is not without flavor, but the flesh of large fish is dear.

In Lower Egypt, gaflar is the name given to large fish of this species, borrowed from the Arabic name of the fish.

Pomfret. Five species of this genus have been recorded from the Nile: M. cephalus, M. capito, M. pethecri, M. saliens & M. cryptochilus. Pomfret capito is hitherto the only species I have observed in the Nile. Towards the end of April or rather with the first hot days of summer they make their appearance in the catch of Cairo fishermen. From then onwards till the end of June, a dozen fish may perhaps be got at Cairo in a week so that in the river the occurrence of grey mullet is of no economic importance. In Lake Manzalah & other brackish lakes on the Mediterranean coast of Egypt, fishing for grey mullet is prosecuted on a large scale. One of the lakes alone produces more fish than all the Nile fisheries together.

According to Günther, the grey mullet in their Nile migration ascend as far as the 1st Cataract, but the fishermen there do not seem to know it.

Chromis: till now only one species of
Chromis has been described from the Nile, viz. C. niloticus. It is, with the possible exception of Habro niloticus, the most common fish in the Lower Nile & it is to be seen in almost every fishing scene depicted on the monuments. Supplemementing to the usual description of the species, I have to add that during the breeding season March to May there exist a most striking difference in the coloration of the sexes. The female possesses the usual colours ascribed to the species together with a series of dark-coloured transverse bands on the body. These are evident in the figure of the fish, although somewhat ill-defined. The male in his nuptial garb is most gorgeous. The head, the region between it and the dorsal fin is a bright carmine red, a colour which is also suffused over the ventral, ventral, the posterior portions of the soft anal & dorsal & usually over the entire caudal fin. The intermucous & interradial membrane of the dorsal fin is a deep black along its free margin, the vestige of the stripe is seen on the body, which is uniformly coloured a beautiful silvery grey. As to his breeding habits I possess no very accurate information. It appears to spawn sometime between the middle of March & the end of May, for it is at this season only that the male dons his sexual colouring. At this period he swims a short distance through the weeds of the pond or canal he inhabits, in three
A few feet of water or even less. I have never observed the habits to be described elsewhere than in these places. Although there is no reason why the fish should not occur in the rivers, I by burrowing with his snout scoops out a depression in the sand or mud at the bottom. In these open spaces in the weeds, he remains through what I believe to be the spawning period. Zealously pursuing all rivals male which in course of their peregrinations after the females approach his nest, I note his dorsal spines erected try to hurdle them out of his territory. Usually this is frequently seen displacing themselves before a wonky extended female as if to entice her to his home. Occasionally, I have observed a male & female fish floating in one of these depressions. What becomes of the eggs after they are laid I am unable to say at present. I have been told by fishermen at different times that the fish takes the eggs in his mouth & hatches them there. A woman who could not possibly have heard of Chronis pateugy of Syria to which a similar habit is accredited, but I have never seen a specimen showing the phenomenon. As early as the end of April the fry are to be seen moving in shoals of several hundreds, keeping well among the pond weeds where they are to a great extent free from the attacks of their enemies. At this period they are about 1.5 cm long.
to all appearance unaccompanied by a parent fish. The young gradually assume the coloration of the adult. At first there is no black spot on the operculum & a black spot at the base of the first part of the rayed dorsal is present in all specimens under 10 or 11 cm. in length. Chronic notches is found in every canal, lake or stretch of water which at one time has been connected with the Nile. As stated above it is able to exist under conditions which most probably would kill any other fish of the river. It grows to a length of 54 cm. that being the length of one of the largest observed during a week's stay at Kibrit-el-Feloum. The Arabs call the fish "Bottu." "Shabir" or "Mish" the latter term signifying a comb which the erected dorsal spines somewhat resemble.

Two years ago I discovered in Lake Menraleh a new species of Chronic which I have since found to be as widely distributed in the lower Nile as Chronic-niloticus. It to possess in a higher degree the capacity for living in brackish water than the common "Bottu." I figured it in Edible fishery of Lake Menraleh under the provisional name of Chronic menraleensis, which I still adhere to. This species is smaller than the common "Bottu," the largest in my possession being 34 cm. long. Its general appearance is so different from the latter fish that it is difficult to account for it not being observed before.

From statistics of 5-5 fish which I have
Examined I measured the length of the head in contained from three to three and a third times in the length of the body including the caudal fin, 9 the depth twice to twice and a third. The upper profile is almost a straight line, 9 the mouth which is much longer than the eye is slightly concave. The interorbital space is but little convex and is a little less than the length of the mouth. 9 about six and three-fifths the breadth of the orbit. The mouth which is extensible is broader than long. 9 is bounded by thick fleshy lips which cover the teeth when the mouth is closed. The teeth are longer than those of C. melastoma 9 as in that species are arranged in four series in each jaw. The front series in each jaw is the largest. 9 the teeth in it are set so that they incline upwards towards the middle line of the body. Each tooth is irregularly lobate, the inner lobe being the larger 9 the crowns are brown. There are 21 or 22 teeth in the front series of each side of the upper jaw. The scales below the eye are in four series. The space covered by them is three times to four times as broad as the angle of the preoperculum.

The spines 9 rays of the caudal fin vary much in number. Out of the specimen examined twenty-six had a fin formula of 15/12, thirteen, 15/13, ten 16/12, three 16/11, two 15/11, 2 16/11, 14/11.
The spines are not so strong proportionately as those of the other species, nor is the difference between the breadth of the two sides of a spine so well marked. The last dorsal spine is the longest. Except that between the first two or three spines, the interspinosus membrane is attached to the entire posterior margin of a spine beyond the apex of which it extends backwards 9 upwards with a slight upward curve. It then bends suddenly downwards 9 becomes attached to the anterior margin of the next spine, at a short distance from its apex. This configuration differs from that in C. niloticus, where the free margins of the membrane present a series of pointed teeth directed upwards. The fifth and sixth rays of the dorsal are the longest 9 when laid back extend as far back as the middle of the caudal in the male, while in the female they are shorter. They do not reach much further than the base of that fin. In the anal, the fifth and sixth rays are the longest, 9 extend as far backwards as those of the dorsal. The fourth pectoral ray is the longest 9 reaches to the level of the anal orifice in males; in females it is shorter. The first ventral ray, extends to the anal opening, or even as far as the origin of the anal fin, in males while in females it does not reach the anus.

The scales are cylindrical, deeper than broad, 9 the largest no more than cover three-fourths of the orbit.

The lower pharyngeals are triangular, 9 are
be closely set with conical teeth with brown apices. The fin and scale formulae are:

D. 14-16 1 3-6 1 9-10 1 2 1 28 16 latus 4/1

The colour of an immature fish or one out of the breeding season is a greenish grey passing into a dirty white on the under surface of the abdomen. While a faint tinge of red shows in the lower fourth of the body. 7 The stripes which are so apparent in a breeding fish are indistinct or altogether absent. The lower lip is large and a beautiful blue which is continued backwards in a line to the edge of the operculum. In general configuration the dorsal fin and 9 anal fins are more or less of a golden-yellow, which is masked by bands of spots except in the case of the pectoral which has a uniform colour. In the anterior part of the spiny dorsal fin and 9 running into the reused part of the fish, there are three horizontal series of greenish white spots which in some individuals seem to run into lines. The anal is often irregularly blotched with black. The caudal possesses several series of spots of an exquisite greenish blue colour in its anterior three. These do not occur in the posterior fourth of the fin, which is quite uniform. The vertical seldom contain a trace of yellow. They are mostly deeply pigmented with black. The centre of each scale is lighter in colour than the circumference. It has a pearly lustre. The upper angle of the opercula,
In the lower portion of the first three rays with the adjoining intermucous membrane is a black spot a little larger than a scale of the lateral line.
is blackish. I have sometimes noticed one or two spots of a golden colour. There is no
difference in the coloration of the sexes during
the breeding season as in the case of A. hilde
nor, the male brighter in colour than the female.
At this period the body above the level of the
pectoral fins is bright brassy yellow interlaced
to olive green. There are eleven black transverse
stripes on the upper part of the body. The last
being placed as far back as the insertions of
the caudal fin. Three of the bands are on
the head! The foremost, situated between the
eyes is convex upwards. I very sharply
defined. If prolonged backward through
the eye it is continuous with the upper
of the two longitudinal bands, also black
in colour, which correspond to the upper
lower division of the interrupted lateral
line. The second band crosses the head
immediately behind the eyes but is not
continued downwards on the operculum;
the third is in front of the perpendicular
from the gill opening. The sides of the
abdomen below the plane of the pectorals
is coloured a bright carmine red,
while the undersurface behind the ventral
is a dusky white. The undersurface of the
head. 9 of the body in front of the ventral
is usually deeply blotched with black.
the blue line in the lips 9 cheeks is more
vivid than in the non-breeding fish. The
black spot on the operculum 9 that on
the soft dorsal are much intensified
all the vertical fins are more or less deeply
Pigmented with black, all traces of markings may be lost. The ventrals also become quite black.

Cynosurus cristatus differs from the Common 'lobby' in its breeding habits. It is distinctly monogamous while the latter fish oftens from my observation to be polygamous. A pair of the former fish, after mating, seek some suitable spot for depositing their eggs. Any firm, resistant structure, as a flat stone, is chosen, but when such is not available, the fish set about excavating a burrow in the mud or sand of the bottom. In Lake Washington I have seen such a burrow over an arm's length in depth. I have known a pair select a crack in the mass of a built canal for their nest. Both sexes assist in the work of digging, as the mouth is not alone used for this purpose. Sand or pieces of stone are seized in the mouth and carried to a distance of two feet or more, from the burrow. Pieces of gravel, about the size of a marble, which I have dropped near the entrance of a nest were immediately cleared away as were often caught before they touched the bottom as the pair work in concert over larger stones which are too heavy for each individually. When a nest has been prepared, the eggs are laid, which from the nature of their envelopes clings together, become affixed to the walls of the burrow or the surface. They are laid in rows in
a single layer covering an area of 6 x 8 cm. square. They are a little less than 2 cm in diameter and exhibit a yellowish green. From the time the eggs are laid I look before while the nest is being prepared, the fish are most assiduous in guarding their spawning place. The fish is allowed to approach without a protest from one or other of the pair. The Chironomus starts at the interruption with its dorsal spine erected, the latter invariably beats a retreat. The parent fish are never at rest. Their movements may not doubt facilitate the aeration of the eggs. For a day or two before the fry become free from their attachment to the stone or wall of the burrow they may be seen struggling in the endeavours to detach themselves. Some in the shape of Barren females. A talk to 4 even immature Chironomus are now selective in their attention to the parents' charge. When the fry detach themselves the latter become very restless in their efforts to guard them. By circling round them the pair seem to produce a vortex which tends to keep the young together. Later when the fry are about 1.3 cm. long, they seem to defend with the guard castings 9 shelters themselves in the weeds. Males are about twice as numerous as females. Their average size of the sexes is about the same. But the unevenly matched pairs are not uncommon in one I took the male was 8.49 the female 16.7 cm. long. The breeding season begins in April 9 and continues till June 20 the beginning of July.
The family of Lethrinidae are well represented in the Lower Nile. Twenty genera including 28 species, in all, are described as occurring in the Nile by Further in Appendix C of Peters' "Travels in Central Africa." Of these 14 have come to my hands, viz:

Clarias anguillaris, Arab. "armoot"

" kassara

" favimanus

Schilde mystus, " Shilde "shilbi ontani

" manoseras, " shuroofa

Ctenophorus nitidus, " " yazga

Siluramdas auritus, " " wadne

Bagrus bayaad, " Bagad

" dicken, " Dicken

Chrysiptysis curatus, " Shal, "razoung, " ran"".."baha

" macrodont, " " futa soda

7 Malapterurus electricus, " Kaid

Clarias anguillaris, kassara, 2 favimanus are common in the rivers below Assuan, as well as in Lake el Barun & the littoral lakes. The species attain a large size; the largest I have seen was a C. kassara 145 cm long. Chance once afforded me an excellent opportunity of observing the aerial respiration of a large specimen of Clarias. The fish was somewhat over a metre in length, & when I first saw it was lying perfectly still, in about 3 feet of water, but for a twitching of its barbules especially the long
maxillaries ones which were kept waving to
8 ft in front of its head. It showed no
inclination to pursue several Nile herrings
(Allopterus) or Barbus which were swimming
about in its neighborhood. Now I again
it would move off sluggishly to some
distance, I return again to the original
resting place. The taking in of air was
done at irregular intervals, but often
after one of its rambles. The point of the
snout was raised above the surface of the
water & the inspiration was simultaneous,
with a discharge of air from the gill slits.
Schilbe mystax & Ctenopoma multiceps are
abundant in the Lower Nile. Schilbe hancocki
& Sillago lucius are not so
common. All these fish are chiefly confined
to the river. They are rarely found in a
canal or bazaar. They are very voracious
& take all kinds of bait freely. The flesh
of all but especially that of S. hancocki
mystax is much esteemed by the Arabs.
Bagrus bunooid & B. domar are common
in the fish markets of Lower Egypt. The
“bunooid” is the commonest of the two &
specimens over a metre long are not rare.
Chrysichthys auratus, the only species of the
genre which I have collected in the Nile
is not abundant. Two or three individu-
als may be the reward for running over
several hundredweights of fish in one of
the markets. The rudimentary spine
present in front of the first dorsal spine
of some Siluridae is well developed in
This fish. The mechanism for locking the spine in the erect position is very perfect. When the vertical spine is fully erected, no lateral movement is possible, although it is pretty considerable when the spine is laid back.

The Scolias (Scolia) are peculiar in a day's fishing in the river. After Chromis I added they are the most abundant fish of the lower Nile. I have seen one specimen, only of P. membranaceus, that a mutilated one. Specimens are rarely got so far north as Cairo but occasionally at the period of low Nile it is caught ashore. Fishermen reply to queries as to why this or other rarer fish are caught most frequently at this season by saying that during the cold months they (the fish) just at the bottom of the river, so only take the bait at the advent of hot weather i.e. at low Nile. I have had confirmed a statement made by Geoffrey St. B. Grant that this fish has the habit of swimming belly uppermost. As an example of the accuracy with which the drawings of natural objects of animals have been done by the artists of ancient Egypt, none better could be found than the representation of Sy. Membranaceus, which is frequently seen on the walls of Egyptian tombs.

It is always shown in a position the reverse of that of other fish. I the eastern belly bluish-black. O the back greyish
is correct. Synodontis schall is the commonest of the two remaining species. Accidents often happen to bathers & fishermen through stepping upon a "shark" The dorsal spine which is sharp may penetrate the sole of the foot & inflict a deep wound. Gangrene & blood-poisoning are said to follow this accident. But with proper treatment (antiseptics) the wound heals up quite normally. 

Molbunkenus electricus is not rare in the lower part of the river, but as the fishes have a dread of its shocking power, it is commonly brought ashore. It is not used for food but its electric organ is employed by the natives in the treatment of pulmonary & bronchial affections. The electric tissue is cut out & dried, and the patient is made to inhale the fumes arising from it when it is burning on a charcoal fire. This belief is wide-spread in the country & it is curious that the torpedoes of the Red sea & Mediterranean should be used for a like purpose.

While Charias Bagrus & Synodontis appear to spawn at or about the period of high tide, as in the latter part of June, the reproductive organs are nearly ripe. I have never been able to procure any very small stilroid fry so that the date of their hatching cannot even be approximately determined. In autumn (November to January) the spotted young of S. senatus (7 to 10 cm) form a large part of the "vomaria" fishermen's catch. The flesh of Stilroidae in general
is instead it is with few exception consumed
by the poorer natives only.
The Characinidae are not so numerous
in the lower part of the river as they are
near the 1st cataract. Yet on the whole
certain species are not uncommon.
Citharinus euctyphus known to the Arabs
as "amr el balah" (moon of the river) occurs
plentifully near Assouan from which place
come the specimens I have in my collection.
It is known at Cairo as I have had its
appearance described to me by the local
fishermen.

Lates niloticus & A. potcheki (Arab. "rai")
are well known to Europeans by the name
of Nile fish. Both species occur in about
equal numbers in the Nile at Cairo. Their
usual food is animal matter. But at the
harvest when boats laden with grain
are passing down the river nearly every
specimen I have examined had its
stomach packed full of wheat or barley.

Brachyistes nurse I have collected in
quantity below the cataract at Assouan
but if it occurs in the lower portion of the
river it is very rare as the form was
quite unknown to fishermen to whom I
showed specimens.

Hydrocyon forskahlii is not plentiful in
river north of Cairo though it is common
further south. It is called "helb el bahia"
"dog of the river" by the natives. I well doo
it deserve this name. It is very ferocious.
I must be accountable for the destruction
of large quantities of young fish. I have watched a large individual of the species preying upon the young Chronus in the ornamental ponds above referred to. I have seen the same fish attack a laborer quite as large as itself. Fish are often caught which are mutilated by the attack of this species.

Hydrocoen brevis, described from the Nile at Khartum, I have not seen in the lower Nile.

I have here to record the capture of a Hydrocoen, which, while answering closely to the description of H. forskalii in Günther's Catalogue of Fishes, differs from it in certain points which I think justify me in describing it as a new species. The total length of the fish is 4.7 cm. Length without caudal 3.95 cm, length of head 4.9 cm. At the greatest depth of the body, 9.7 cm. The length of the head is therefore contained five times exactly in the length of the body minus the caudal, or the height 4.3 times making the head to be comparatively shorter than in any of the species of the genus described in Günther's Catalogue of Fishes. The fin formulae are

D. 10 A. 15 V. 10. L lat. 46. L max. 7.05

In this respect it agrees perfectly with H. forskalii and H. lineatus. It has two scales interposed between the elongated scale at the root of the ventral and the lateral line. There are 2 teeth on each side of the upper jaw, 9 The lower
just agreeing in this respect with 16. conicus. The coloration is shiny. Each series of scales above the lateral line 9: the one immediately below it presents a black longitudinal streak in a dead specimen. The streaks break continuity to become blackish spots in the centre of each scale of the series. The lower lobe of the tail is a bright orange red as is also the case with 16. forshallii. At least 9 other Characimidae of the series. The specimen which as an only one I did not draw from any cartographer is at present in the collection of the Cairo Medical School labelled provisionally *Ditodesos niloticus* called Egyptian or "nilefish" by the locals is of frequent occurrence in the fish markets of the Delta and attains to a large size. Its flesh is better flavoured than that of most Nile fish. In May last year I obtained one specimen of *D. engyptiacus* (12.5 cm. long) in the Cairo fish market. This is the first recorded occurrence of the species in the lower Nile. It is noticed that the Characimidae as a family become more numerous in the lower Nile during the period of inundation. Altera Hydrocoris are the only two genera of the family frequenting the canals of Lower Egypt, where they make great havens amongst the fry of fish which spawn in these localities. The family Phrynidae are as a most characteristic feature of the Nile fish fauna. They are not common in the markets as the...
habit of being not lend themselves to the simple methods of capture which the native fishermen use so successfully against other Nile fish. They frequent the deep parts of the river, and nearly always the neighbourhood of rocks or stones. If we may believe the fishermen they are nocturnal. They are usually caught on hooks but rarely in nets. They appear to breed at the period of increase of the river, as I have observed individuals with ripe generating organs about that time. Nothing is known about their breeding habits or mode of spawning. The flesh of the mormyridae is firm, is not so sensitive as that of other Nile fish and is consequently the most highly valued by the natives, who are almost the sole consumers of Nile fish. All the members of the family except Gymnocranius are generally designated "anurn" by the Arabs. But some are given special names which shall be mentioned below. Commonest of all in the lower part of the river is Mormyros cachinii. 9 specimens over 60 cm. are not rare. This Mormyros cachinii is known as a"xie" or simply "anurn" or "akel-bous", the "nursed one" (lit. father of the mouth). At a rough glance both of these species seem one, and it is likely that the oxyrhynchus of the ancients includes both. As showing of the oxyrhynchus in the tombs are refer to either species. Being a sacred fish, mummies of it are available for examination but those I have seen are
too mutilated to permit of identification.  
The coryphines does not appear to reach the size of the above species. 

Mr. Saumarez called "bon" by the Arabs, is not so common at Cairo as it is further up the river. This is the following species are often met with amongst the fry of Lake & Thames in the fish markets.

This coryphines is commoner at Cairo & in the Delta than the above species. According to the fishermen, is often taken quite near the

or head of town.  

Hypsephorhynchus dorsalis (Boul. "Anuma") is more frequently met with than the two last mentioned species. Small specimens, 15 cm. or under, are common. I examples of between 40-50 cm. long are often caught. The irregularly bristle dark spots seen on the dorsal aspect of a large sized fish are absent in the young.

Note. I have remarked the scratchs & wounds on the sides of the head & body of specimens of Mr. Cachin & Mr. coryphines but have obtained no construction of the statements made by Herodotus Geoffrey St. Helier & Joannis as to the cause of the injuries.

Coryphines dentice. Although some species of this family have been recorded from the Upper Nile I am not aware of the occurrence of a coryphines dentice noted from the lower part of the river. I have obtained Coryphines calcaritrans in the Nile near Damietta where they were moderately abundant. The
They swarm in the shallow waters of the shores of Lake Moerewa and it is just possible the specimens observed had entered the river through some of the irrigation canals connecting it with the lake, as I have never found them elsewhere than in this particular part of the river.

The Cyprinidae are as far as numbers go, abundantly represented in the river. The genus Labeo of which three species have been described from the Nile furnishes almost one half of the weight of fish sold in the fish markets on the river.

Labeo nilotica, arab. 'libbe; libbe', is the most common species. L. robusta, arab. 'hawth', occurs in but small numbers in lower Egypt. L. argentea does not occur in the lower Nile.

Less abundant than Labeo, but nevertheless prominent in an average catch from the river is Barbus bynni (arab. binni), the flesh of which is better flavoured than that of "libbe." Barbus nevis is very common in irrigation canals and in the shallow parts of the river. It swarms in the neighbourhood of villages and with the fry of Chromis act as scavengers of the filth thrown poured into the river at these places. It is also destructive to fish eggs. I have observed numbers of them around the spawning ground of a Chromis species, darting in the patch of eggs, when the attention of the parents' fish is attracted by some other object. B. nevis appears.
To spawn earlier than most Nile fish. As I have seen fry 14 mm. long at the end of April.

It ought to be mentioned that the black stripe described as extending from the occiput to the middle of the caudal does not exist in the living or freshly killed fish. In these there are three (rarely four) round black spots on each side of the body, one at the base of the caudal fin, another just behind the occiput, and the third on a level with the posterior margin of the dorsal fin. The spots with the exception of the first disappear in becoming indistinct in spirit specimens, their place being taken by the blue streaks above mentioned. It is known to the Arabs as "Barbus" or Beninc.

Clupea picea, the shad, (and "salbougha") ascends the river in large numbers during the winter months. They begin to appear in Cairo about the 20th of December and are caught in considerable quantities in the months of January and February. After the middle of April they retire to the sea. I have not secured specimens from further south than Beni Seneid. But the description of a fish given me by the fishermen at Assouan makes me think that their migration extends as far south as the 1st Cataract. The fish is considered excellent when salted. A nearly whole that is taken in the river is made into "fishkah." By the fishermen, the salbougha is said to grow large 3 feet when it enters the river, to become gradually thinner in the sea after its return, and the following winter when it again ascends the river.
The common eel, Anguilla vulgaris, call. "aab el-hayat" (lit. 'father of the world) Ta'abun el-bahl (river serpent) & hamash' is very common in the lower Nile, but becomes scarce, as the 1st Cataract is approached. It abounds in the fresher waters of Lake Menzaleh & it is caught in great quantity at the re-entrance of that lake in the month of December. They are then leaving the lake to spawn & it is reported that the fry enters from the sea a month later. Anguilla labiostris is at present included in the most recent list of Nile fishes. A type of a figure in Raphaël's 'Voyage en Égypte' depicts 1805 jusqu'en 1834, but an authentic record of a single specimen is wanting. 

Heterodon lineatus arac "kahaka" is not commonly taken by fishermen on the river, probably on account of its habit of frequenting rocky places. Numerous small specimens, 12 cm. long are, are to be found amongst the crayfish, taken from the posts left by the reed diggers. The longest specimen measured was 34 cm. long. The flesh is not eaten, but the fish is in request by the curiosity dealers who stuff it roughly for sale in the louquait season.

Polypterus bethle is of rare occurrence in the lower Nile. During 4 ½ years' residence in Egypt, I have only seen two specimens. These were from the Nile, near Cairo or to be exact one of them was caught in a well to which the Nile has access in high flood. According to report three or
Some are caught off Cairo during a season, but I think this unlikely as the price offered for specimens is sufficient inducement to the men to bring that or any other rare fish ashore; moreover, its appearance to the name are not generally known to the fishermen in Lower Egypt. At Assouan the fish, although known, is not common some years ago a well-known American zoologist had to leave the country without securing a specimen. He visited the Caire markets daily for several weeks, but at Assouan he employed fishermen to fish expressly for this fish without success. It is said to be common in the Nile above Khartoum, so that with the opening of the Sudan many interesting points in the natural history of this & other tropical species of Nile fishes ought to be cleared up.