

**The natural history of fishes of the perch family. Illustrated by thirty-six plates coloured ; with memoir and portrait of Sir Joseph Banks, bart / By Sir William Jardine, bart.**

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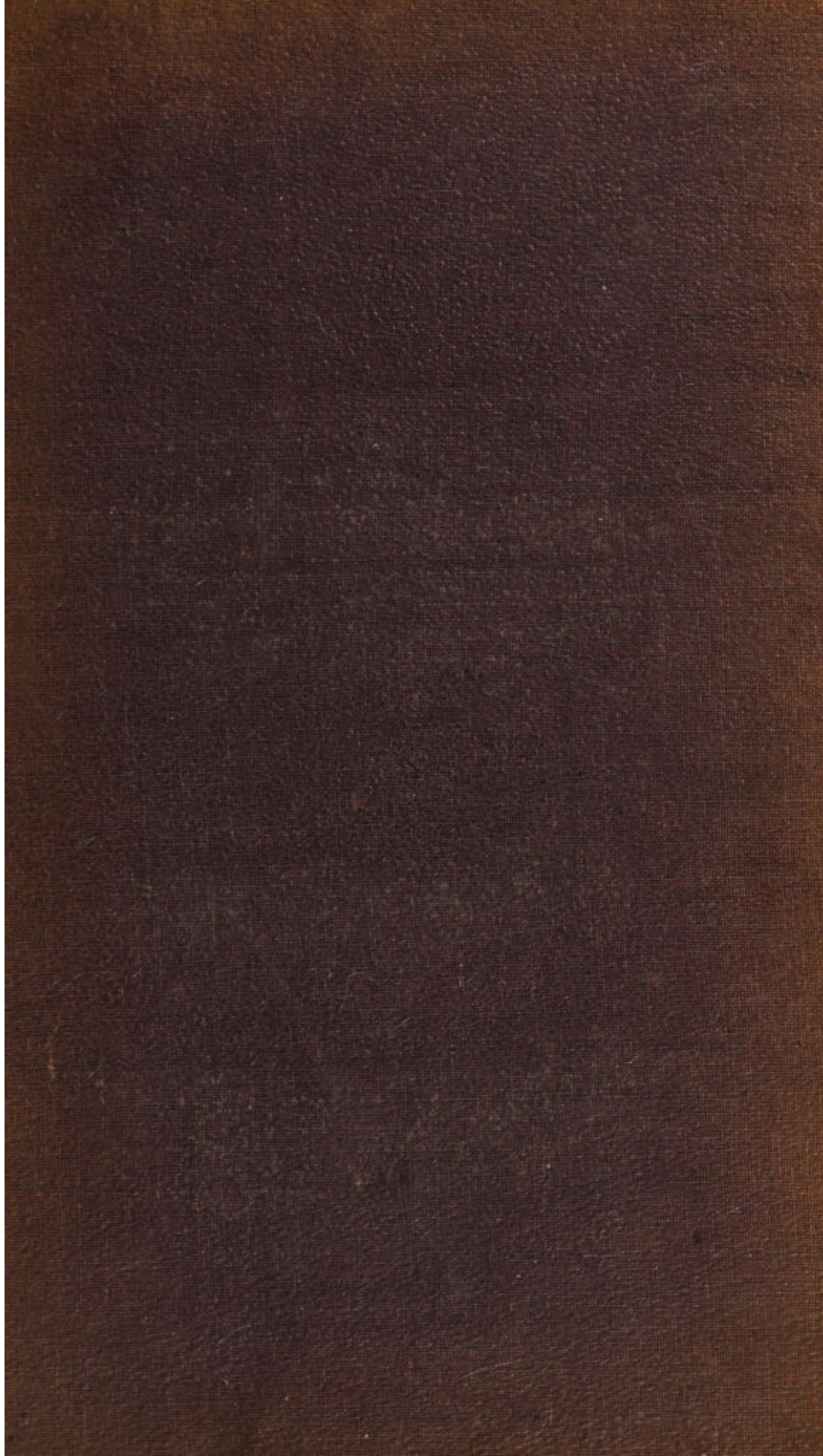
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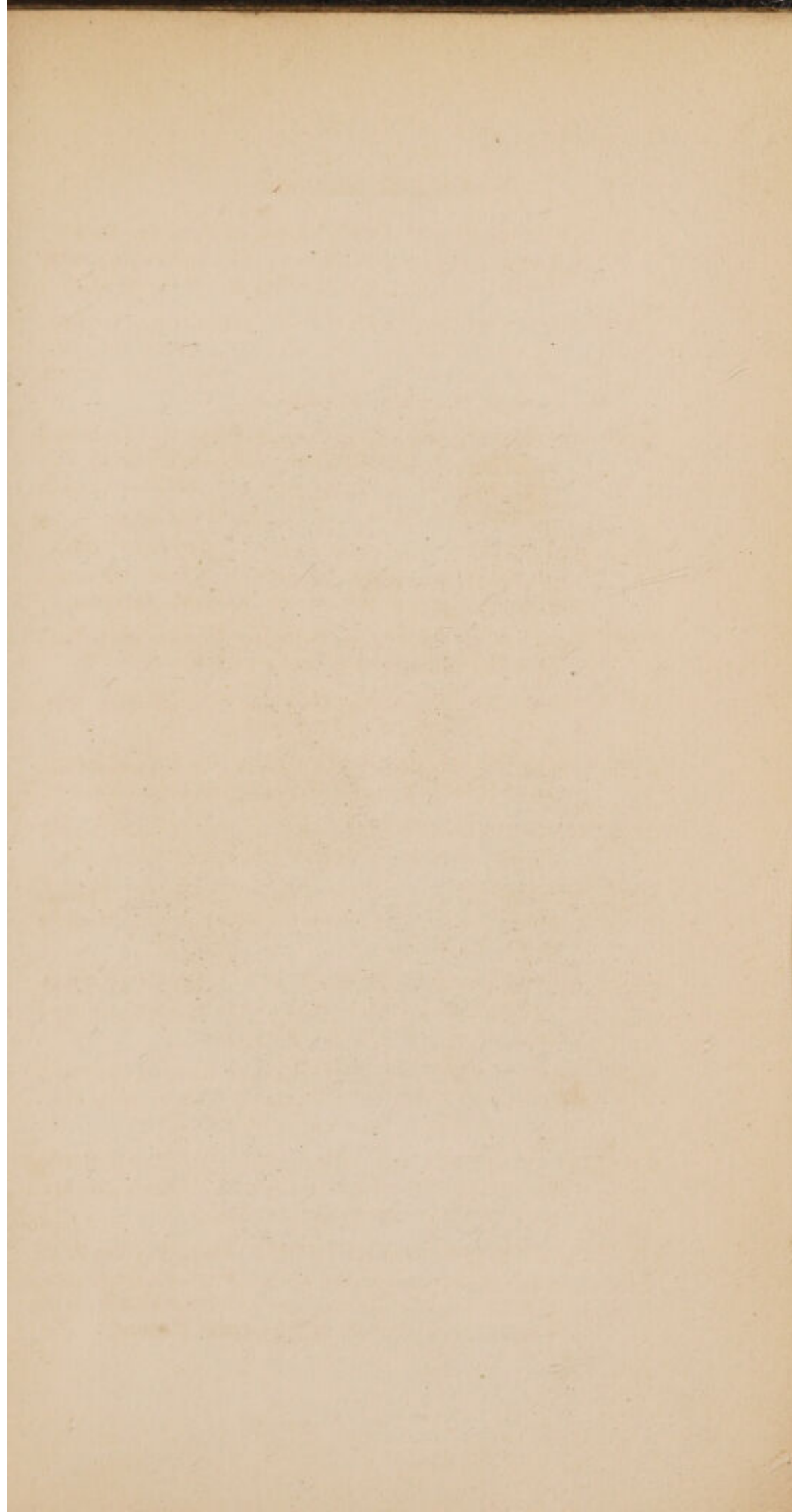
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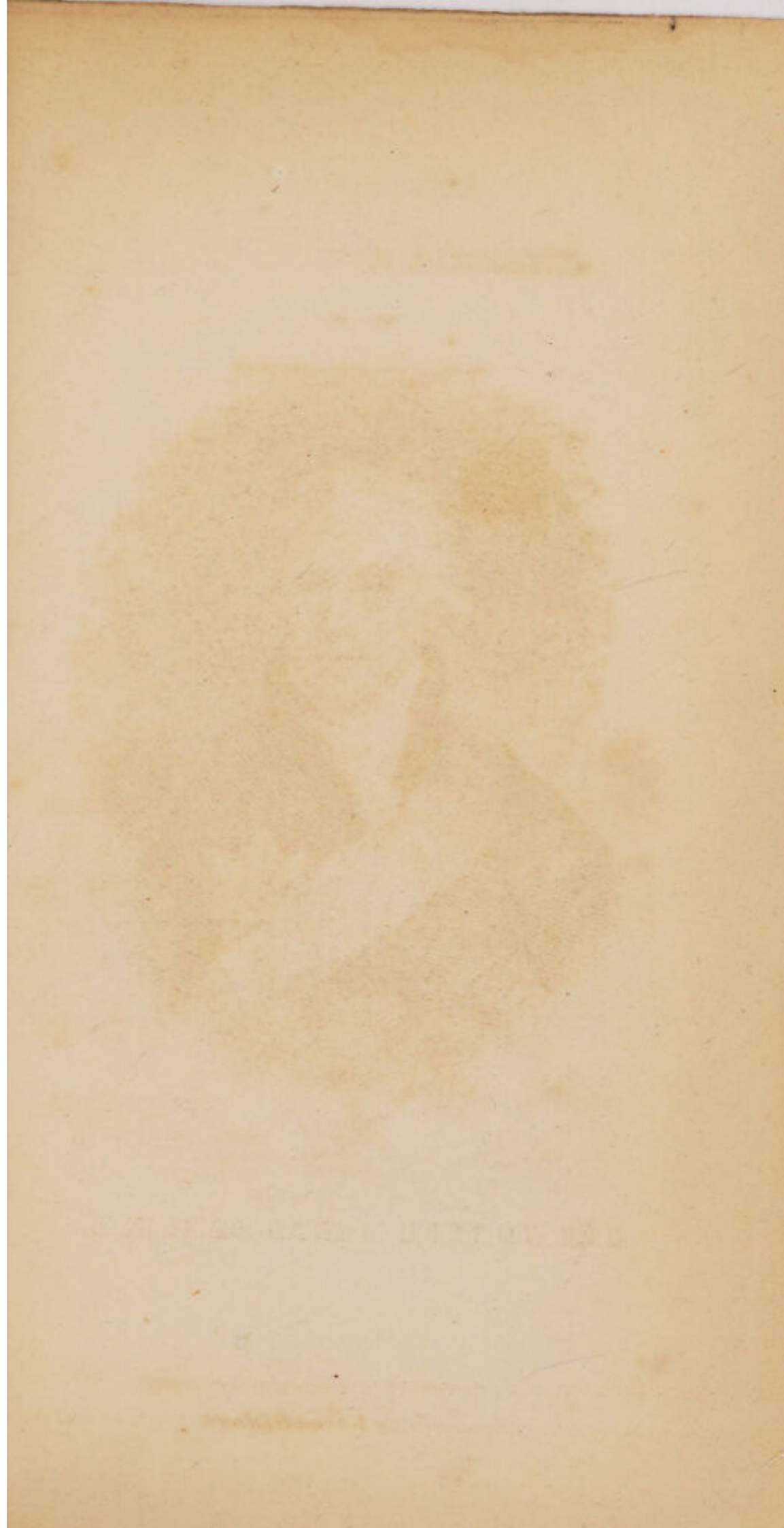






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ICHTHYOLOGY.

VOL. I.

THE PERCH FAMILY.

BY  
SIR WILLIAM JARDINE, BART.  
F.R.S.E., F.L.S., &c. &c.

EDINBURGH:  
W. H. LIZARS, AND STIRLING & KENNEY;  
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1835.



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THE  
NATURAL HISTORY  
OF  
FISHES  
OF  
THE PERCH FAMILY.

ILLUSTRATED BY THIRTY-SIX PLATES COLOURED;  
WITH MEMOIR AND PORTRAIT OF  
SIR JOSEPH BANKS, BART.

BY  
SIR WILLIAM JARDINE, BART.  
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objects, cannot fail to be interesting, on account not only of their peculiar habits, uses, and localities, but also of the subject being new in the Naturalist's Library. Our wish at the commencement of this work was to have given volumes upon the four departments of Zoology—Mammalia—Ornithology—Ichthyology—and Entomology—consecutively and alternately; but this we found to be impossible, without trespassing too much upon the patience of our subscribers: so that we have been obliged to bring the volumes before the public irregularly; we trust, however, this publication will, in the end, be what was at first promised,—

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comprehensive, elegant, and cheap, beyond all precedent.

We have availed ourselves of the appearance of Mons. Agassiz' work upon the Fossil Remains of Fishes, by giving, in Plates XXXIII, and XXXIV, his Fossil representations of species, which, at a glance, will be seen to be nearly allied to the family which we have chosen for our present volume; and although it may seem somewhat foreign to our plan to admit such figures

into our pages, yet the interest which scientific men, and the public in general, have lately taken in these extraordinary discoveries, will, we hope, secure for us the approbation of our patrons in this as in all other instances. In our future volumes on this department, we purpose to continue to avail ourselves of such facilities, more especially as Ichthyology offers them in greater abundance than are to be found in the three other branches of our zoological illustrations.

We have introduced as back grounds, wherever they could be procured, the scenery which the fishes frequent. In many cases, the landscapes are representations of real views, which will be discovered upon examination of the plates; the figures upon which, with the exception of the fossil remains already mentioned, have been taken from the magnificent work upon this subject, by the Baron Cuvier, and M. Valenciennes, whose representations are so perfect, as to leave little to be desired in the way of improvement.

We are indebted to a private friend for the interesting Memoir of Sir Joseph Banks, which precedes the descriptions in this volume, but whose name we have not succeeded in persuading him to give. We, however, take this opportunity



of offering our warmest acknowledgments, and hope he will soon again favour us with another Memoir, which we trust will be found full of interest.

Before concluding this advertisement, we beg to repeat part of our notice from our former volume.

“ In the farther conducting of this undertaking, the Publisher has much pleasure in assuring the subscribers, that the assistance of several of the most talented Naturalists has been for some time devoted to volumes now in a state of considerable forwardness. Amongst others, the Natural History of the Columbidae (Pigeons) has been undertaken by Mr SELBY of Twizell, author of the Illustrations of British Ornithology, and will very soon appear. The drawings have been made expressly for this work by Mr LEAR; and, considering the union of such talents, and the beauty of the objects themselves, this volume promises to be one of the most splendid and interesting which has yet adorned the Naturalist's Library.

“ The volume on the Natural History of Coleopterous Insects, (Beetles,) by the Rev. JAMES DUNCAN, joint author of the Entomologia Edinensis, is also nearly ready for publication; and

also nearly ready for publication ; and the beauty, variety of forms, and number of the figures, (upwards of 110 insects being represented,) together with the interest excited in their extraordinary history, must ensure it a favourable reception. Our volumes on Mammalia and Ornithology, were the first attempt at presenting the public with so extensive a series of correct representations of animals, in a highly finished and coloured form, with their authentic histories, at so cheap a rate ; and our Entomological volumes will also be found to realize, to the fullest extent, the promises held out in the original Prospectus. The volume will be enriched by a Memoir and Portrait of John Ray, the father of Zoological Science in Britain.

“ Volumes on the Natural History of Deer—of Dogs—of British Butterflies—of Fishes—Parrots—&c.—are also in forwardness, so that we may now safely anticipate regularity of publication for the future.”

The next volume, on Coleopterous Insects, (Beetles,) is printed, and will be published in May, and the volume on Pigeons in July.





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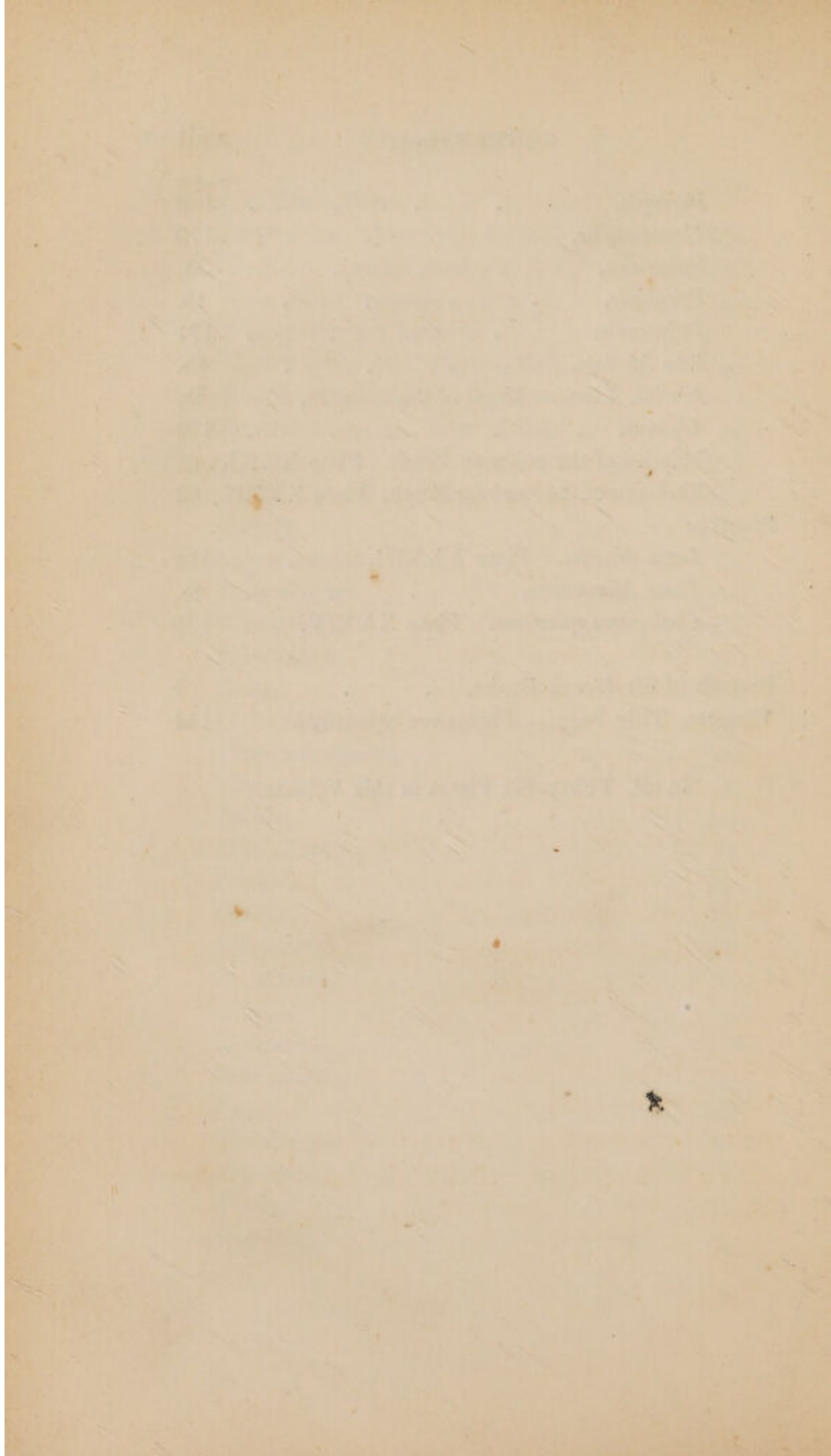


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In all, Thirty-Six Plates in this Volume.





MEMOIR  
OF  
SIR JOSEPH BANKS.

---

ALTHOUGH we cannot claim for the subject of our present memoir that exalted rank as a practical naturalist, by which Linnæus and Cuvier have been distinguished—though as an author he may be said to be almost unknown,—yet there have been few men in this country to whom physical science is more beholden, as his whole life was devoted to the encouragement, and his ample fortune to the illustration of it in all its branches. He lived before the taste for natural history had become generally diffused, and it was his pride and his delight, to give it that fostering protection it required in his day, from the wealthy and the noble. At the present time, when a society exists for the promotion of each department of natural history—when London, Dublin, and Liverpool, boast of zoological collections—and a botanic garden, a museum,

and a lecture room, are attached to most of our provincial towns, we can scarcely appreciate the merits of an individual who set the bright example before us, and contributed in so great a degree to produce this gratifying result. Let the present generation, who reap the benefit of his exertions, not ungratefully forget the memory of Sir Joseph Banks.

His father was William Banks Hodgkinson,\* Esq. the proprietor of Revesby Abbey, in Lincolnshire, where his only son Joseph was born, February 13, 1743. He received the rudiments of education at home, under a private tutor, and afterwards went to Harrow, from thence to Eton, and finally completed his studies at Christchurch, Oxford. He had the misfortune to lose his father at the early age of eighteen. It is greatly to his honour, that, thus left

Lord of himself, that heritage of wo,

there was no alteration in his habits of study, and that he resisted the allurements of youth, wealth, and freedom from parental control, for the quiet enjoyments of science. Natural history appears

\* He assumed the surname and arms of Hodgkinson in compliment to his maternal grandfather. He married Sarah, daughter of William Bete, Esq. who died August 27, 1804. Besides the subject of this memoir, they had one daughter, who died unmarried, September 27, 1818.



to have occupied his ardent mind, and botany, in particular, to which public attention had been excited through the recent publication of the Linnæan system in England, was his favourite pursuit. The gardens of Lee and Kennedy, at Hammersmith, supplied him with foreign plants, and his own industry and research for British specimens completed his practical instruction in this fascinating and exhilarating department of study.

Soon after he left the university, his friend Lieutenant Phipps, afterwards Earl of Mulgrave, being ordered with a ship of war to protect the Newfoundland fisheries, Mr Banks gave the earliest proof of his eager desire for knowledge, by sacrificing the advantages and comforts of his station as a wealthy landed proprietor just coming of age, and accompanying his friend on his voyage to this inhospitable climate. The stern realities of privation and danger with which he thus became acquainted, however interesting in the narrative, were calculated to check the ardour of a young man of independent fortune, and it might reasonably have been expected that he would have rested satisfied with this first attempt, and have henceforth been content with the reports of others ; but this was far from the case. They daunted not the inquiring mind of Mr Banks, for he no sooner heard of the expedition that government were about to fit out for the South



Seas, under the command of Lieutenant Cook, than he intimated to his neighbour, Lord Sandwich, then first Lord of the Admiralty, with whom he was in the habit of enjoying aquatic sports on Whittlesea Mere, his desire to be permitted to join the expedition. This was readily acceded to, and Mr Banks determined to spare no expense in availing himself of the advantages that were thus opened before him. He, therefore, engaged the celebrated Dr Solander,\* the friend and pupil of Linnæus, at a salary of £400 per annum, during the voyage; together with Mr Sydney

\* Of the wisdom of this choice, Dr Pulteney's character of Solander is a proof. He says, "At this juncture, it is material, among those circumstances which accelerated the progress of the new system, (the Linnæan,) to mention the arrival of the late much lamented Dr Solander, who came into England on the first of July, 1760. His name, and the connection he was known to bear as the favourite pupil of his great master, had of themselves some share in exciting a curiosity, which led to information; whilst his perfect acquaintance with the whole scheme enabled him to explain its minutest parts, and elucidate all those obscurities with which, on a superficial view, it was thought to be enveloped. I add to this, that the urbanity of his manners, and his readiness to afford every assistance in his power, joined to that clearness and energy with which he effected it, not only brought conviction of its excellence in those who were inclined to receive it, but conciliated the mind, and dispelled the prejudices of many who had been averse to it." — *Sketches of the Progress of Botany*, vol. ii. p. 350.

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however, to give the advice than to resist the inclination, for the Doctor himself was the first to violate the injunction, and had it not been for the energy, intrepidity, and resolution of Mr Banks, he would have fallen a victim to his indiscretion. By his exertions he was at length removed to a place where they had succeeded in kindling a fire. "Here they passed the night in a situation, which, however dreadful in itself, was rendered more afflicting by the remembrance of what was past, and the uncertainty of what was to come. Of twelve, the number that set out together in health and spirits, two were supposed to be already dead; a third was so ill that it was very doubtful whether he would be able to go forward in the morning; and a fourth, Mr Buchan, was in danger of a return of his fits\* by fresh fatigue, after so uncomfortable a night. They were distant from the ship a long day's journey through pathless woods, in which it was too probable they might be bewildered, till they were overtaken by the next night; and, not having prepared for a journey of more than eight or ten hours, they were wholly destitute of provisions, except a vulture, which they happened to shoot while they were out, and which, if equally divided, would not afford

\* Mr Buchan was one of Mr Banks's draughtsmen. He was subject to epileptic fits, and died at Otaheite, on the 17th of April.



each of them half a meal ; and they knew not how much more they might suffer from the cold, as the snow still continued to fall."\* At daybreak, however, after having cut up their vulture into ten portions, and given every man his share to cook in his own way, they prepared to set out, and providentially found themselves nearer to the beach than they expected, for they had made a circuit of the hill. They thus succeeded in reaching the vessel by mid-day, with the exception of two of the party, a seaman and a negro, who died.

We have selected this adventure as a proof of the ardour with which Mr Banks entered on the duties he had volunteered, and the courage and perseverance with which he at all times pursued the objects of the expedition. Indeed, he must have been a most valuable assistant to Lieutenant Cook during the whole of his arduous and responsible undertaking, for he appears never to have shrunk from services of danger ; but, on the contrary, to have taken the lead on all emergencies. We will give another instance of great fortitude, by which a principal object of the voyage was secured from defeat.

It is well known, that to observe the transit of Venus over the sun's disk, from some of the islands of the South Seas, was the purpose for which the *Endeavour* was primarily fitted out, in

\* Hawkesworth.

consequence of a memorial being presented to his Majesty from the Royal Society ; and, for this purpose, an observatory had been erected at Otaheite, where the ship had arrived on the 13th of March. But, on the morning of the 2d of May, on going to fix the quadrant for use, it was found to have been stolen. In this dilemma, Mr Banks volunteered to go in search of it ; and, in company with Mr Green, the astronomer, and unarmed, except with a pair of pocket pistols, they proceeded to the interior of the country, to demand its restitution. In this delicate mission they were happily successful. When they arrived at the place to which they had been directed, they met one of the natives "with part of the quadrant in his hand. At this most welcome sight they stopped ; and a great number of Indians immediately came up, some of whom, pressing rather rudely upon them, Mr Banks thought it necessary to shew one of his pistols, the sight of which reduced them instantly to order. As the crowd that gathered round them was every moment increasing, he marked out a circle in the grass, and they ranged themselves on the outside of it, to the number of several hundreds, with great quietness and decorum."\* Here, after some little difficulties, the stolen property was restored, and

\* Hawkesworth.



thus, by the presence of mind and prudence of Mr Banks, the instrument was recovered without disturbing that harmony with the natives, so essential to the objects of the navigators.

Another anecdote of Mr Banks displays his enthusiasm in obtaining the most correct information as to the manners of the people amongst whom he had become a resident. He had a great desire to see a funeral procession, but was told his only mode of doing so with propriety, was to take a part in it, which he determined to do ; and, for this purpose, he was stripped of his clothes, and a piece of cloth being tied round his middle, his body was smeared with charcoal and water ; and in this guise he joined the procession. It is needless to give other instances of Mr Banks's zeal : they might be multiplied to an indefinite extent. Cook paid him the well merited compliment of naming after him one of the newly discovered Islands of New Zealand, lying in latitude  $43^{\circ} 32'$  south, and in longitude  $186^{\circ} 30'$  west.

At New Holland, while the ship was undergoing repairs, the world had nearly been deprived of the labours of this enterprising naturalist. In order to secure his collections, and preserve them with more than ordinary care, he had removed them to the bread room ; but the workmen, in their necessary repairs of the vessel, threw her so much abaft, that her stern was filled with water, by



which many of his specimens were entirely destroyed. The greater part, however, by great care and attention, were restored. There was now every appearance of a successful termination to their voyage, when the discovery of the very defective state of the ship obliged them to stay at Batavia. Here a scene of horror occurred, from which the heart recoils. The whole crew were in a few days seized with illness, arising from the pestilential air of the country, neither Mr Banks nor Dr Solander excepted. They were both pronounced so ill, that there was no chance for recovery, except by a removal to a country house, which was procured for them about two miles from town. Here, after much suffering, they slowly recovered. They set sail from this den of pestilence December 26, 1770, having buried there the surgeon, and six others. Forty of the crew were in a state of extreme disease. \*

Despair

Tended the sick, busiest from couch to couch ;  
And over them, triumphant, Death his dart  
Shook.

Twenty-three of these miserable beings died on their passage to the Cape, among whom were two of Mr Banks's retinue, namely, Mr Parkinson, the natural history painter, and Mr Sporing. The remainder reached the Cape, March 15, 1771 ;

and, after a safe voyage from thence, they landed at Deal, Wednesday, June 12, having been absent three years.

One very important consequence of this voyage, and which was brought about chiefly by the influence of Mr Banks, was the introduction, in 1793, of the Bread Fruit Tree (*Artocarpus incisa*, and *Artocarpus integrifolia*) into the West Indies. It is a native of the South Sea Islands. In reference to this event, Bryan Edwards observes: "Among all the labours of life, if there is one pursuit more replete than any other with benevolence, more likely to add comforts to existing people, and even to augment their numbers by augmenting their means of subsistence, it is certainly that of spreading abroad the bounties of creation, by transplanting from one part of the globe to another such natural productions as are likely to prove beneficial to the interests of humanity. In this generous effort Sir Joseph Banks has employed a considerable part of his time, attention, and fortune; and the success which, in many cases, has crowned his endeavours will be felt in the enjoyments, and rewarded by the blessings of posterity."\*

At his return, Mr Banks was received with enthusiasm by all ranks. He had been some time

\* *History of the West Indies.*



a member of the Royal Society ; and, during the short time he remained at home, he took an active part in their proceedings. Government were so well satisfied with the results of Lieutenant Cook's first voyage that he received a captain's commission, with instructions to take the command of an expedition on a larger scale, which was to sail the following year. Mr Banks fully intended to have again accompanied him, and expended several thousand pounds for instruments and other preparations for the voyage, when an unfortunate dispute with the Navy Board disgusted him, and he abandoned the idea ; but having again engaged the services of Dr Solander and other scientific gentlemen, he determined to explore Iceland, at that time very little known. For this purpose he chartered a vessel, at an expense of £100 per month, and left London the 12th July, 1772. The party consisted of Dr Solander, Dr Von Troil, another Swedish naturalist, Dr Lind of Edinburgh, as astronomer, Lieutenant Gore, who had sailed with him round the world, three draughtsmen, two amanuenses, with servants and seamen to the number of forty people. Having visited the Western Islands of Scotland, they were forced, on the night of the 12th of August, to cast anchor in the sound between Mull and Morvern, opposite to Drummen, the seat of Mr M'Lean. They were immediately invited to land. During breakfast,



next morning, the conversation turned upon the island of Staffa, which another guest of M'Lean, an Englishman of the name of Leach, had been visiting a few days before. His account stimulated the curiosity of the new visitors, whom he politely offered to accompany to the spot. This was eagerly accepted. Previous to this visit, this magnificent specimen of "nature's architecture" had never been examined by scientific observers, and was scarcely known beyond its immediate neighbourhood. Mr Banks took a minute survey of the whole, with measurements and drawings of the basaltic columns, and transmitted his account to Pennant, who printed it in his *Tour to Scotland*, which had been made the same year. Dr M'Culloch has more recently described this celebrated wonder, which is now familiar to every one. His measurements differ from those of his predecessor, and are probably more accurate.

On the 28th of August they arrived at Iceland, and cast anchor at Bessestedr, on the western part of the island, where the dismal appearance of the country alarmed them. "Imagine to yourself," says Von Troil, "a country which, from one end to the other, presents to your view only barren mountains, whose summits are covered with eternal snow, and between them fields, divided by vitrified cliffs, whose high and sharp points seem to vie with each other to

deprive you of the sight of a little grass which scantily springs up among them. These same dreary rocks likewise conceal the few scattered habitations of the natives, and no where a single tree appears which might afford shelter to friendship and innocence. The prospect before us, though not pleasing, was uncommon and surprising. Whatever presented itself to our view bore the marks of devastation, and our eyes, accustomed to behold the pleasing coasts of England, now saw nothing but the vestiges of the operation of a fire, Heaven knows how ancient." This exclamation was merely the effect of the contrast alluded to. It was precisely the situation adapted to their inquiries ; and, to a mind like Mr Banks's, intent on exploring the wonders of Nature on a most magnificent scale, such a scene must have been fraught with peculiar attractions. The following account of their visit to the great Geyser will be read with interest. " Among the many hot springs to be met with in Iceland, several bear the name of Geyser.\* The following is a description of the most remarkable of that name, and in the whole island. It is about two days' journey from Hecla, near a farm called Haukadul. Here a poet would have an opportunity

\* From the Icelandic *geysa*, to rage, burst forth with vehemence and impetuosity.

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roaring ; and we soon saw with our naked eyes what before seemed almost incredible. The depth of the spring, or pipe from which the water gushes, cannot well be determined ; for sometimes the water sank down several fathoms, and some seconds passed before a stone, which was thrown into the aperture, reached the surface of the water. The opening itself was perfectly round, and nineteen feet in diameter, and terminated in a basin fifty-nine feet in diameter. Both the pipe and the basin were covered with a rough stalactitic rind, which had been formed by the force of the water ; the outermost border of the basin is nine feet and an inch higher than the pipe itself. The water here spouted several times a-day, but always by starts, and after certain intervals. The people who lived in the neighbourhood told us that they rose higher in cold and bad weather than at other times, and Egbert Olafsen, and others, affirm that it has spouted to the height of sixty fathoms. Most probably, they guessed only by the eye, and on that account their calculation may be a little extravagant ; and, indeed, it is to be doubted whether the water was ever thrown up so high, though, probably, it sometimes mounts higher than when we observed it. The method we took to observe the height was as follows. Every one in company wrote down, at each time that the water spouted, how high it appeared to him to be

thrown, and we afterwards chose the medium. The first column marks the spoutings of the water, in the order in which they followed one another ; the second, the time when these effusions happened ; the third, the height to which the water rose ; and the last, how long each spouting of water continued.

	Time.	Height.	Duration.
No. 1	at 6 42 A.M.	30 feet.	0 20 seconds.
2	6 51	6	0 20
3	7 16	6	0 10
4	7 31	12	0 15
5	7 51	60	0 6
6	8 17	24	0 30
7	8 29	18	0 40
8	8 36	12	0 40

The pipe was now, for the first time, full of water, which ran slowly into the basin.

9	9 25	48	1 10
10	10 16	24	1 0

At thirty-five minutes after twelve, we heard as it were three discharges of a gun under ground, which made it shake ; the water flowed over immediately, but instantly sank again. At eight minutes after two, the waters flowed over the border of the basin ; at fifteen minutes after three, we again heard several subterranean noises, though not so strong as before ; at forty-three minutes



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The hot springs were thus examined; the volcanoes, diseases, government and laws, the literature, and manners and customs of the inhabitants, were all eagerly inquired into. Numerous curiosities of all kinds were purchased and brought to this country, which they reached in safety in November; and Mr Banks presented to the British Museum no less than one hundred and sixty-two Icelandic manuscripts, which he had procured at his own expense. Many years afterwards, the inhabitants of Iceland received a grateful testimonial of the interest they had excited in the bosom of the travellers; for, on the breaking out of the war between Great Britain and Denmark in 1807, the Icelanders were apprehensive of starvation, from the customary supplies from the mother country being intercepted by our ships of war. Sir Joseph Banks, however, not forgetful of his old friends, humanely exerted himself, and, by his interest with his Majesty's Government, procured licences for Danish vessels to proceed to Iceland on condition of their touching at the port of Leith, and subsequently procured an Order in Council, dated February 7, 1810, prohibiting all acts of hostility against Iceland, and the rest of the Danish colonies in the Arctic Seas, and taking the inhabitants, and their property, under the special protection of Great Britain.



This voyage terminated his foreign travels, and for some years Mr Banks passed his time between his Lincolnshire property and his house in London, where he formed a splendid library, with a valuable and extensive collection of natural curiosities. He corresponded with the celebrated men of all countries, and was looked up to as a proper person to preside over the Royal Society. They had for some time been embroiled in party disputes, which led to very acrimonious feelings on both sides, and finally to the resignation of Sir John Pringle, on St Andrew's day, 1778, when Mr Banks was elected president in his room. There was at the time much difference of opinion as to the propriety of this selection. It was objected that he had not sufficiently distinguished himself as an original discoverer, or even improver, in any branch of science. For the first few years he had many opponents, but the suavity of his manners, and the zeal with which he prosecuted the objects and interests of the Society, finally triumphed over his adversaries.

On the 29th March, 1779, he married Dorothea, daughter and co-heiress of William Weston Huguesson, Esq. of Provender, in the parish of Norton, in Kent, with whom he lived happily many years. They had no children, but this lady survived him, dying on the 28th of June, 1828. In 1781, the King, with whom he had become a



favourite, conferred the dignity of a baronet upon him, and many years after distinguished him by the Order of the Bath, at that time a very rare honour to a civilian, and he was subsequently sworn a member of his Majesty's Privy Council.

In the meanwhile, his situation at the Royal Society was by no means an easy or an enviable one. The celebrated Dr Horsley (afterwards Bishop of St Asaph) headed a party who were attached to the study of the abstract sciences, and partly from jealousy of the attention that was paid to natural history, and probably equally jealous of the aristocratic members, whom it was insinuated that the president had introduced to the Society from no other qualification than their rank, he threatened secession in the following energetic speech :—"If other remedies fail, we can at least secede. When the hour of secession comes, the president will be left, *with his train of feeble amateurs*, and that toy upon the table, the ghost of that society in which philosophy once reigned, and Newton presided as her minister." Finding himself not supported in his views, he did actually withdraw, with some others, and left Sir Joseph to the peaceable and undisturbed possession of the chair for nearly forty years.

He now assumed that rank in the literary and scientific world becoming his station, as the head of so illustrious a body. His house in Soho Square

was open to all who were distinguished by talents, of every country. His library was accessible to every one engaged in kindred pursuits; and, to render it more generally useful, an arranged catalogue of it was published, and most generously distributed in all quarters where it was likely to be of service. It was commenced in 1796, and completed in 1800. Its title and arrangement are as follows:—“*Catalogus Bibliothecæ Historico Naturalis Josephi Banks, Regi a Consiliis Intimis, Baronetti, Balnei Equitis, Regiæ Societatis Presidio, &c. Auctore Jona Dryander, A.M. Regio Societatis Bibliothecario.*”

Tomus 1. Scriptores Generales,	Londini	1798
Tomus 2. Zoologici,	.	1796
Tomus 3. Botanici,	.	1797
Tomus 4. Mineralogi,	.	1799
Tomus 5. Supplementum et Index Auctorum,		1800

The books are methodically classed, and numerous references are made to the authors of memoirs and papers, in all the Transactions of the learned societies throughout Europe, America, and the East. The number of pages and plates in the respective volumes being indicated in the catalogue, renders it particularly valuable. The library is rich in German, Swedish, and other northern writers, which are extremely rare in this country. Among the scarce English books, there are the first edition of Izaak Walton's “*Complete Angler*,



or the Contemplative Man's Recreation." London, 1653, small octavo ; and a work published by John Earl of Bute, of which his Lordship printed only sixteen copies for private distribution. It is entitled " Botanical Tables, containing the different Families of British Plants, distinguished by a few obvious parts of fructification, ranged in a synoptical method ; some observations on the terms employed in Botany, and particularly on those borrowed from the anatomical descriptions of animals ; and a glossary explaining botanical terms, with numerous figures." 9 vols. 4to.

While thus in the enjoyment of wealth, rank, fame, literary society, and the personal esteem of his sovereign, a circumstance occurred that had nearly occasioned him to forfeit the latter, and which also deeply offended many of his friends in the Royal Society. In January, 1802, the National Institute of France having been new modelled, elected and placed him at the head of their Foreign Associates, a compliment the greater, that their number was limited to eight. Sir Joseph naturally felt proud of the honour, and expressed his gratitude in the following letter :

" LONDON, *January 21, 1802.*

" CITIZENS,—Be pleased to offer to the National Institute my warmest thanks for the honour they

have done me in conferring upon me the title of Associate of this learned and distinguished body. Assure, at the same time, my respectable brothers, that I consider this mark of their esteem as the highest and most enviable literary distinction which I could possibly attain. To be the first elected to be an associate of the first Literary Society in the world, surpasses my most ambitious hopes; and I cannot be too grateful towards a society which has conferred upon me this honour, and towards a nation of which it is the literary representative — a nation which, during the most frightful convulsions of the late most terrible revolution, never ceased to possess my esteem; being always persuaded, even during the most disastrous periods, that it contained many good citizens, who would infallibly get the upper hand, and who would re-establish in the hearts of their countrymen the empire of virtue, of justice, and of honour.

“Receive more especially, citizens, my warmest acknowledgments for the truly polite manner in which you communicated this agreeable intelligence. I am, with sincere esteem for your distinguished talents, &c. JOSEPH BANKS.”

That this letter was hyperbolically worded, there can be but one opinion. But a candid allowance might be made for the enthusiasm of the moment; and it would probably have excited little



observation, had not his old antagonist, Bishop Horsley, seized on it with avidity, and commented on it with much bitterness in a letter addressed to its author, which he printed, and privately circulated, under the signature of *Misogallus*. The King, (George III.) who sometimes suffered his political feelings to govern his conduct, even in the decision of a scientific question, and who had taken offence at Sir John Pringle (Sir Joseph's predecessor in the chair of the Royal Society) for countenancing Franklin's lightning conductors, was deeply offended at these expressions of "esteem" for a republican institution. His Majesty's anger had, no doubt, been excited by the remark of Horsley, that the letter "was replete with sentiments which were a compound of servility, disloyalty, and falsehood; sentiments which ought never to be conceived by an English heart, never written by an English hand, and least of all, by yours, distinguished as you are by repeated (out of respect to his Majesty I will not say unmerited) marks of royal favour." The ire of the Royal Society was provoked by the following passage of Horsley's letter: — "It was reserved for the head of the Royal Society of London to assure an exotic embryo academy, that he is more proud of being a mere associate of the latter than president of the former; that he considers their election of him as 'the



highest and most enviable literary distinction which he could possibly attain,' and that he deems them the 'first literary society in the world.' Sir, I have read with pleasure and with profit many volumes published by the Royal Society, and with due submission to you, I assert that the cultivation of science is more indebted to their exertions, than to those of any other institution whatsoever; but I am yet to learn the merits of this novel association of revolutionary philosophers into which you have been enlisted. What acts, but acts of robbery, have we seen of them? Where are the proofs of their pre-eminence? It is incumbent on you to produce those proofs, and to convince the British literati that your contempt of them is just."

Whatever difference of opinion there may exist as to the terms in which the honour was acknowledged, Sir Joseph had deserved the compliment, by the liberality of his exertions in procuring the restitution of scientific collections addressed to the Jardin du Roi at Paris, which had been captured by our ships during the war with France. It is said that his intercession was no less than ten times successfully exerted in this manner. "He thought that national hostility should find no entrance among followers of science." These are traits in his character highly deserving of remembrance, and an eminent member of the Institute, in his



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ever a zealous promoter of the interests of the Board of Agriculture and the Horticultural Society,—not making his favourite studies a mere barren and speculative amusement, but ever ready to render them subservient to purposes of general utility. Indeed, there was no institution for the encouragement of science, or that proposed to enlarge and multiply the comforts of mankind by the diffusion of knowledge, by useful experiments, or by diligent investigation, that he did not liberally and cordially patronize. He took an active and a leading part in the formation of the African Institution; he prevailed on the Government to explore the extensive shores of New Holland; and was a strenuous supporter of the Royal Institution.

In these pursuits, and in the exercise of a generous hospitality, passed the latter days of Sir Joseph Banks. His house in Soho Square was open every Sunday evening during the winter season. The kind and attentive manner in which he discharged the duties of host, the brilliancy of his conversation, the galaxy of talented individuals he collected around him, the display of curiosities in nature and art with which the rooms were crowded, rendered these meetings an intellectual treat of no ordinary kind, the recollection of which will long survive in the memory of his friends. He latterly became a martyr to the



gout, so much so, that he required to be lifted in and out of his carriage by two footmen. He at first tried ginger in very large quantities, until he acknowledged "he had fairly exhausted all its virtues." He then had recourse to a more questionable remedy,—the much vaunted quack medicine, the *eau médicinale*, but with little ultimate benefit, though he at first flattered himself it had afforded him relief. Being at length exhausted, he expired on the 9th of May, 1820, in the 78th year of his age.

His zeal for the interests of science extended beyond his life, for in his will he devised his very valuable and extensive library and foreign correspondence to the British Museum; \* his drawings of plants from the Royal Garden at Kew to that establishment; his papers respecting the Royal Society, to the Royal Society; and those respecting coinage to the Mint; and to Mr Frederic Bauer, who had for thirty years been in his employ as a botanical draughtsman, an annuity of L.300, upon condition of his continuing the series of drawings of the plants from Kew Gardens, upon

\* The Banksian Library is placed in the 5th, 6th, and 7th rooms of the upper floor of the Museum; and in the entrance hall is a statue of Sir Joseph, by Chantrey, representing him in the vigour of youth, seated in an arm-chair, holding a scroll in his right hand. It was presented by his personal friends.



which he was engaged at the time of his death. His only separate publication was a pamphlet on the blight in wheat, but there are several of his papers in the Philosophical and Horticultural Transactions. We have before alluded to his description of Staffa in Pennant's *Second Tour in Scotland*.

In early life Sir Joseph was tall and well proportioned, with a countenance expressive of dignity and intelligence. His manners were polite, his conversation rich in instructive information, frank, engaging, unaffected, without levity, yet endowed with sufficient vivacity. He was an accomplished gentleman, a judicious inquirer, a diligent votary, and a liberal patron of science and learning. The period of his life was one peculiarly fitted to render his talents and patronage of great importance to the advancement of natural history. The encouragement given by the Government to voyages of discovery, afforded a striking opportunity for a gentleman of wealth and influence to ensure a proper attention being paid to these important subjects by taking on himself the expense of all the arrangements connected with their illustration. In addition to this no trifling advantage, Mr Banks added his own personal services. On his return, those benefits naturally placed him in a prominent point of view; and by forming at his house a repository of all that was



curious, and collecting together persons of kindred minds, he was the means of giving an immense impetus to the progress of botany, zoology, and mineralogy, which led in a great measure to the institution of societies for the advancement of each. And it is matter of congratulation that our knowledge of Natural History has materially increased through the formation of these societies, and the improved mode of investigation by the aid of anatomy and physiology, which they have encouraged. The influence of an individual may now be of less consequence, but let us not estimate the merits of individual exertions by their present value: we must remember

“ ’TIS SIXTY YEARS SINCE ”

the foundation was laid by him whom we have thus imperfectly commemorated.

# ICHTHYOLOGY.

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## INTRODUCTION.

———— The sounds and seas, each creek and bay,  
With fry innumerable swarm, and shoals  
Of fish that with their fins and shining scales  
Glide under the green wave, in sculls that oft  
Bank the mid-sea.

The carp, with golden scales, in wanton play ;  
The trout in crimson-speckled glory gay ;  
The red-finn'd roach, the silver coated eel ;  
The pike, whose haunt the twisted roots conceal ;  
The healing tench, the gudgeon, perch, and bream :  
And all the sportive natives of the stream.

THE volumes of this work which are already published, have been devoted to the inhabitants of the land and air : we are now about to commence that series which has been marked out for the history of beings living in another medium, which differs in its composition, and therefore requires organs and structure varying from those which we have in part seen were in possession of the others. We shall also find these organs well



adapted to the elements in which they are destined to be employed, and whether used for sustenance or progressive motion, or furious attack and courageous defence, equalling in their powers the tusks and claws of the lion and the bear, or the swiftness of the courser, the swallow, and the falcon.

The study of fishes, technically termed *Ichthyology*, was, perhaps, longer in being brought to what might be called a science, than the histories and descriptions of animals and birds. The difficulty of procuring a numerous series of individuals, and the impossibility of penetrating and pursuing them in the deep recesses of the ocean, withdrew the constant charm, which novelty of form threw over the branches constituted by those animals which inhabited the same element with ourselves; and unless almost as a necessary article of sustenance, few fishes were taken from their proper habitations. In the earlier ages, fish were most extensively used as an article of food, and, at the present time, among several northern tribes, they form a great part of the support, not only of the natives themselves, but also of their beasts and cattle;\* in other parts, they were the only money of the country, and dried fish

\* According to Freycinet, the inhabitants of the Sandwich Isles devour fish when newly caught, and when they are scarcely dead.—*Voyage autour du Monde*

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quality, we still find, almost invariably, this method practised, often with very great dexterity, or with a bait sometimes affixed to the point of the weapon as a lure to entice the fish within reach. The clear view given in the water by fire or torch light, was also early discovered, and formed a powerful and destructive accessory. Hooks became a later invention, naturally succeeding the greater experience which an intercourse with the manners of the animals themselves would suggest; at first made of the rudest form and coarse materials,—as shell or bone or hardened wood,—they did their office ill, were only fitted for the larger kinds, and exhibit a striking contrast with the finely polished and tempered wire, and the beautiful material gut, now in use.

Fishing, from a pursuit of necessity, became one of emolument, and during the Greek and Roman ages the profession of a fisherman was one of the most common and respectable; and farther intercourse and experience produced improved hooks, nets and lines of finer quality but equal strength, better fitted to retain and to deceive, though the older practices of spearing were still retained, accompanied with a greater array of followers, and weapons of more approved form and delicate temper. Approaching still nearer to our own times, we see hardy races of men almost solely employed in providing for the luxurious

taste of the great European markets, and supplied with vessels beautifully built, materials and weapons of the best description, — the fisheries, supported by governments, becoming the nurseries of seamen, and of great importance in the revenues of kingdoms.

From attention being thus necessarily and unavoidably directed towards fish, and the means of taking them, rude drawings were preserved of the more important kinds. They were perpetuated on the coinage of the countries, and bold but characteristic sculptures have been preserved, from which many of the species in ancient use can be traced. Such may be said to be the commencement of Ichthyology, and so also it may be said to have progressed until the works of the illustrious Aristotle threw a light over every branch of Natural History, and advanced this one to a state of comparative arrangement. From this man of universal observation was derived almost all the information — the groundwork, at least, of all the works on Ichthyology till the seventeenth century, and even since this period he has been much relied on. Rondoletius and Salianus gave figures of many species, those of the latter often very correct, and, at the same time, exhibiting curious specimens of engraving. But Willoughby and Ray were perhaps the first to attempt a methodical arrangement,



founded upon structure, and it was only after their time that the science and its promoters became more generally known. Artedi, a name dear to every ichthyologist, with Linnæus, and his numerous pupils, pursued it in its systems; Pennant and Pallas studied it with enthusiasm, and were assisted in their knowledge of species by the results of the scientific voyages of Commerson, Sonnerat, &c. and in their physiological researches, by the works of Haller, Camper, Monro, and John Hunter.

Following these great names, we had, for the arrangement and descriptive parts, the Ichthyologies of Lacepede, Russell, Shaw, Dumeril, Risso, Rafinesque, Donovan, Jurine, Hamilton Buchanan, and the outline of Cuvier in the *Regne Animal*: these men availed themselves of the numerous scientific voyages which Europe, at the termination of the last and commencement of the present century, has been so liberally supporting, and which have collected so much information in every branch of Natural History; while in the physiological details may be mentioned the names of Geoffroy St Hilair<sup>e</sup>, Carus, Humboldt, and Sir Everard Home.

In this immense array of science, in which have been noted, as it were, only the very heads, a stupendous collection of facts have been recorded, which, however important, curious, or



amusing, remained alone on the authority of their discoverers, memorials of their persevering research; but they were neither arranged nor collected, and the want of some general system for this science, by which a definitive state of our knowledge could be gained, was indispensable for its progress, and eagerly called for by every naturalist in Europe. The long experience of the Baron Cuvier was destined to commence the filling up of this gap; and the foundation of the structure has been laid, and so far raised, in a manner worthy of its builder, in the work we have selected as our "Text Book" for the present volumes. In 1828, Cuvier commenced the arrangement of the materials which he had been collecting during his whole life, for a "*Histoire Naturelle des Poissons*," and with the assistance of a younger, but able naturalist, has published nine volumes, illustrating the greater part of the first section of the divisions into which these creatures have been separated by him. We now propose, after giving a short sketch of the nature and uses of Fishes, to proceed to the detail of those contained in the first section of Cuvier's arrangement,\* so far as the limits of this volume will allow, continuing it with the next volume, and at the same time making use of the information which

\* See Table of Cuvier's arrangement, p. 86.



several interesting voyages have given, since the publication of the first parts of the Baron's work.

But before proceeding with this part of the subject, we must very shortly notice another branch, which, till lately, has been comparatively neglected,—that of Fossil Ichthyology. Previous to 1600, there are perhaps few records of fossil fishes. Fabius Columna and Worm wrote *De Glossopetris*; in the following century, we had Scheuchzer and Fischer; and, towards its conclusion, the *Ittiolitologia Veronese* of Volta, a large folio containing seventy-six plates, which, if not very faithful in execution, shewed the interest which was at this time excited; but it was not until so late as 1818 that an enumeration of the fossil species previously known was first attempted by De Blainville in *Le Nouveau Dictionnaire d'Histoire Naturelle*. Since then, the science has gradually advanced, from its intense interest, and its connection with the studies of the geologist; and at the commencement of the last year, it assumed a most important station from the researches of a naturalist of Switzerland, and the appearance of the first numbers of a work devoted to this department. The *Recherches sur les Poissons Fossiles* of Louis Agassiz will undoubtedly mark the commencement of a new era in this science; for, independent of the perspicuity and clearness with which the department



itself is illustrated, the study of existing species, being necessary for a knowledge of those which are extinct, has induced the author to give his views of the science generally, and to propose an arrangement entirely different from those of his predecessors, the characters of which are principally taken from the form and structure of the scales. His orders are as follows:—I. *Placoidians*—so named from the irregularity presented by the solid parts of their covering, composed of masses of enamel. It includes many fossil forms, the Sharks, and Rays.—II. *Ganoidians*—containing varied forms, the Sauroid fishes, Siluri, Sturgeons, &c. characterized by scales of an angular form, composed of two substances, plates of horn or bone, placed one upon another, and covered by a thick layer of enamel.—III. *Ctenoidians*—The common character is in the thin plates forming the scales being pectinated or toothed on their posterior edge, which makes them feel rough to the touch. It contains the Chetodons, Pleuronectes, the Percoid fishes, &c.—IV. *Cycloidians*—They have the scales formed of simple plates, those of the lateral line with a tube for the transmission of the lubricating mucus. It includes the Mulletts, Salmon, Cyprini, &c.\*

\* If we estimate the number of fish now known, to amount to about 8000, we may state that more than three-fourths of this number belong to two only of the above



The situation in our systems which has been allotted to fishes, has generally been the fourth place, or the lowest rank, in the scale of the vertebrata. They seem to have been more particularly connected with the class which immediately precedes them, by those most extraordinary creatures, long since extinct, but which now occupy so much of the attention of the geologist, the *Ichthyosauri* or Fish-Lizards, and which the discovery of new forms lead us to believe were a numerous race, perhaps possessing intermediate ability to exist either in air or water. Fishes are entirely inhabitants of the waters, peopling this immense portion of our globe with their shoals, and serving to keep in check the varied creatures of still lower structure, while they themselves are held in check, and afford sustenance to millions

mentioned orders, the *Cycloidians* and *Ctenoidians*, whose presence has not been discovered in formations below the chalk.

The other fourth part of living species is referable to the orders *Placoidians* and *Ganoidians*, which are now far from numerous, but which existed during the whole period which elapsed since the earth began to be inhabited, to the time when the animals of the Greensand lived.

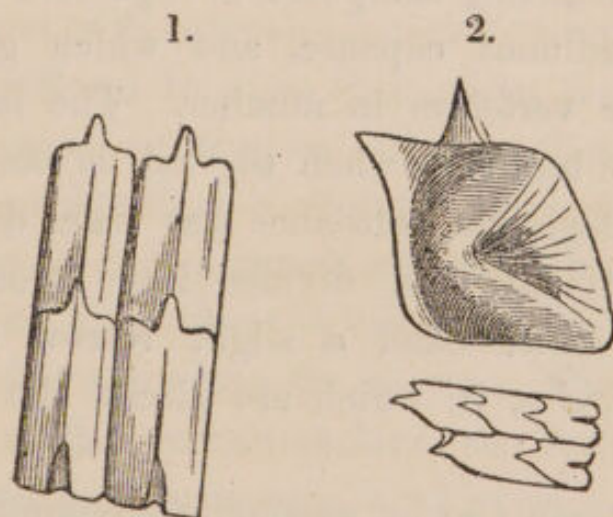
M. Agassiz does not know a single species of fossil fish which is found successively in two formations, while he is acquainted with a good number which have a very considerable horizontal extent.—*Ed. Phil. Jour.* xxxv. 175.

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there is no imbrication at all, and the edges meet like plates or the flags of a pavement. But one of the more remarkable contrivances for holding them in connection, is seen in some fossil species, where the incumbent scale is furnished with a hook, or tooth, which fits into a corresponding hollow in the lower edge of the upper scale, better understood by inspecting the accompanying cuts of those of (1) *Paleoniscus*\* *Freieslebeni*, and (2) *Pholidophorus*† *macrocephalus*, Agass.



The skin is immediately attached to the muscles, the outer lateral layer of which will be seen in the accompanying plate, (Pl. XXXI.) One great muscle (*a*) occupies nearly the whole side, and is almost the only one which is externally

\* παλαιος, ancient ; ονισκος, *oniscus*.

† φολιδοφορος, scale-bearing, like a snake.



visible. It arises from the upper part of the head, at *b c*, and the bones of the shoulders, and is inserted into the sides of the bone of the tail. It is separated above from its corresponding muscle on the opposite side, by the spine and its epiphysis, by the deep muscles of the interspinal bones, and by the ribs which surround the abdominal cavity; beneath it widens to admit the lower fins and the muscles which belong to them. The structure of this great muscle is complicated. It is transversely composed of slips held together by a tendinous expanse, and which generally equal the vertebræ in number. The layers or plates are best seen when the fish is boiled, and the cartilaginous substance has been dissolved. Longitudinally it is divided into three bands. In the centre band a slight furrow may be observed, *d e*, in which are placed the mucous glands.

The Baron Cuvier assumes the common perch among fishes as the form in which the greatest general perfection is exhibited, (see a somewhat similar form, Plate I. of the Granulated Perch,) and being a species familiarly known to every one, will serve to convey an idea of this class of beings; and the accompanying plate (Plate XXXII, of the Skeleton of the Perch) exhibits the bony structure in osseous

fishes. No. 1 is the principal frontal bone; 2. Anterior frontal bone; 3. Posterior frontal bone; 4. Temporal bone; 5. Parietal bone; 6. Maxillary bone; 7. Intermaxillary bone; 8. Suborbital bone; 9. Supra scapular bone; 10. Preopercle; 11. Opercle; 12. Subopercle; 13. Interopercle. The above references will enable the observer to understand the characters of the genera, which are, in a great measure, taken from the form of these bones in the head.

In the perch, and indeed in all those fishes which are endowed with extensive locomotive powers, or require swiftness to seize their prey, the tail is the great organ of motion, while the fins are the balancers or directors, a contrary arrangement to that shewn in the members of those creatures of the land and air, where the tail is the director or helm, the feet and wings the movers. The fins on the upper surface serve to balance the body, those on the lower surface to turn it, to move it slowly, and to keep it suspended in strong currents; but in all these, the motion or assistance of the tail is observable. In very swift motion the fins are quiet; the creature could not keep them extended, far less use them, and they fold closely to the body, and offer no resistance to its rapid passage through the water. In what are called flat fish, however, and in all those whose horizontal



surface is large, the fins assist considerably in progressive motion, and their motion upwards and downwards, and not in the line of progression, offers no resistance.

Another powerful accessory in the buoyancy of fishes, is what is called the air, or swimming, bladder; and whatever functions it may hereafter be found to possess, similar or resembling those of the lungs of aërial beings, there can be no doubt of its assistance when a fish wishes to rise or sink. It is generally situated in the upper part of the ventral cavity, running parallel to the spine, and it often communicates with the intestinal canal, by an opening placed near the boundary between the œsophagus and the stomach, though in some fishes no communication or opening has been discovered. In those where no communication with the œsophagus has been found, it is conjectured that the air in this organ is secreted within it; and this opinion has been strengthened by the presence of a red fleshy body occurring on the interior of the walls of the bladder, and by the influence which a wound in the bladder produced in the function of the gills upon the blood. It is a very curious subject, difficult to investigate, and several eminent ichthyologists have adopted the opinion of this organ in part performing the office of

lungs. It is of various shapes, sometimes seeming like a simple bag extending the whole length of the cavity, sometimes cut as it were in two, by a narrow stricture, and having the appearance of two irregular sacks. The supply of air can be compressed by muscular action, and accordingly will serve to assist in raising or sinking the animal; and it is remarkable, that in those fishes which reside much at the bottom, and seldom or never come to the surface, this organ is almost always wanting.

But independent of the common manner of progressive motion among fishes, other means have been given them, by which either a great accession of power is added; or where the ordinary limbs are small, or wanting, organs of an entirely different nature have been constructed. In a genus of fishes, mentioned by almost all travellers as amusing the weariness of a long sea voyage, the immense development of the pectoral fins, and the power the animal possesses of raising and sustaining itself for a considerable time above the waves, has gained for it the epithet of Flying. The action, however, appears to have more resemblance to a long and vigorous leap, than to flight as practised by the denizens of the air. A difference of opinion exists as to the motion of the pectoral fins, whereby they are for the time



supported. Cuvier says the animal beats the air during the leap, but we question if this is said from actual evidence. Dr Abel, however, supports the assertion in his voyage to China; but Mr Bennet, a later observer, is of a contrary opinion. "The flight of these fish," he remarks, "has been compared to that of birds, so as to deceive the observer; however, I cannot perceive any comparison, one being an elegant, fearless, and independent motion, whilst that of the fish is hurried, stiff, and awkward, more like a creature requiring support for a short period; and then its repeated flights are merely another term for leaps. The fish make a rustling noise, very audible when they are near the ship, dart forward, or sometimes take a curve to bring themselves before the wind, and, when fatigued, fall suddenly into the water. It is not uncommon to see them, when pursued, drop exhausted, rise again almost instantly, proceed a little farther, again dipping into the ocean, so continuing for some distance until they are out of sight."\* With this view we are rather inclined to coincide; but however the motion is performed, it is certain that they can progress out of the water, according to Captain Hall, for a distance of at least two hundred yards, and,

\* Bennet's Wand. i. p. 33.

according to Mr Bennet, to a height of from two to twenty feet.

Another manner of transportation is by means of an apparatus by which the animal can fix itself to any object in motion. Many fishes are supplied with an organ of this kind, which also seems to be used as a means of keeping themselves secure amidst the turmoil of a storm, affixing themselves to rocks and other steady substances. Among the most remarkable of these is the *Remora*, or Sucking Fish, far famed in ancient story for its power over the vessels of the mariner. These fishes are of a narrow lengthened form, the head large in proportion to the body, and furnished with a flat oval shield composed of transverse plates, each furnished with a row of fine teeth: this is termed the sucking plate, and by means of it they attach themselves firmly to the bodies of larger fish, or the bottoms of ships, and are thus transported. The common White Shark seems to be their most frequent carrier, to which four or five have been often found attached. The tail and fins of the *Remora* are all comparatively very small, and the fish has no air bladder.

The *Perca scandens* transports itself, and scales rocks, and even plants that grow from the water, by means of the alternate use of the spines of the pectoral fins, and M. Renau has asserted that he



knew a species of *Lophius* which walked about the house like a dog ; while the *Doras costatus*, by the bony arms of its fins, assisted by the plates under the belly, which work like those of serpents, can march over land as fast as a man can leisurely walk.\*

The body of fishes is lubricated by a slimy fluid, prepared in a series of glands generally placed near and about the fore parts, a beautiful natural arrangement, to allow the fluid to be carried backward ; or the same office is performed in a more mechanical manner by what is called the lateral line, and which is in reality a canal on the scales, which is either continuous, and conveys the lubricating fluid backwards from the head and neck, or has a communication with a series of glands laterally disposed.

In the Skate there is a large serpentine vessel which surrounds the mouth, runs between the skin and the muscles at the sides of the five apertures into the gills, and likewise surrounds the nostrils ; then it passes from the under to the upper part of the upper jaw, where it runs backwards as far as the eyes. From the principal part of this duct, in the under side or belly of the fish, there are not above six or eight outlets ; but from the upper

\* Dr Hancock, *Zool. Jour.*

part near the eyes there are above thirty small ducts sent off, which open on the surface of the skin. But besides this very picturesque duct, there is on each side of the fish, a little farther forwards than the foremost of the five breathing holes, a central part from which a prodigious number of ducts issue, to terminate on almost the whole surface of the skin, excepting only the snout or upper jaw. At these centres the ducts are all shut, and in their course have no communication with each other.\* In the skate the whole cellular substance of the nose or snout secretes a mucus, which is dispersed by bundles of tubes opening exteriorly. The Eel and Conger have large openings at different parts of the nose, communicating with numerous lengthened vessels analogous to the winding canals of the Skate.† But in almost every fish these have a distribution differently managed according to their wants, forming one of the most beautiful and necessary provisions in their whole structure. That of the Cod, from its simplicity, will best shew it, reduced from one of the characteristic plates of Monro.

\* Monro, pl. vi. vii.

† Cuvier, i. 252.

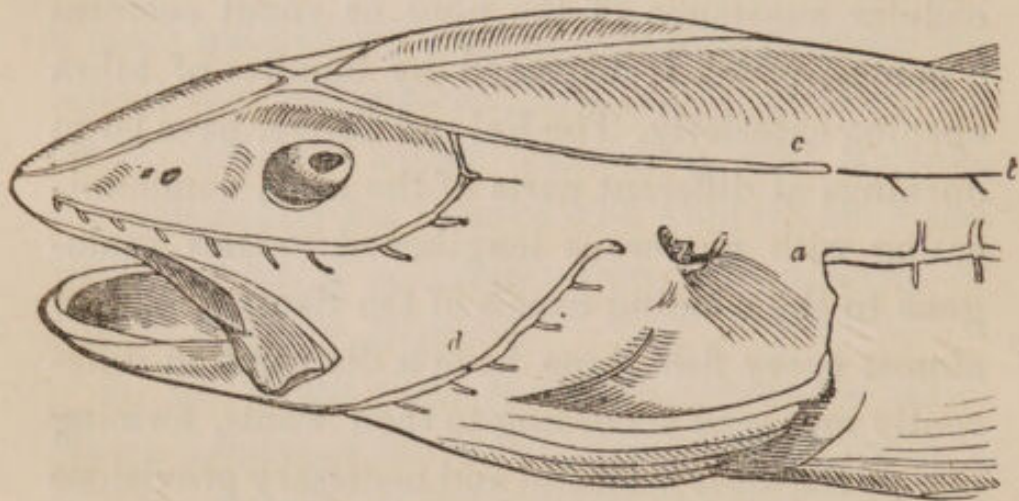


*a* The termination of a large lymphatic, which begins at the tail and runs upwards on the side of the fish, receiving its branches from the skin and muscles of the trunk at nearly right angles.

*b* The upper end of a mucous duct, which runs upon the side of the fish nearly parallel with the lymphatic *a*, and which has numerous short branches, with open mouths, which pour out mucus upon the surface of the skin.

*c* is the continuation of the duct *b* cut open.

*d* Another mucous duct, having no communication with *b* or *c*, and which discharges its mucus upon the surface of the skin of the under jaw by a number of short branches



One of the most remarkable contrivances in the economy of fishes, is their respiration. The medium which contains the air, being fatal to all terrestrial animals which would attempt to inhale them in conjunction, a different apparatus for their employment was necessary, which we find in the form of *branchiæ* or *gills*, as they are termed, placed near the forward extremity

of the animal, and protected by a bony case or covering, often defended by strong spines, which in the horrid array which covers some species, are almost always placed on these parts. This sort of respiration has been termed aquatic, and, among the vertebrata, is found in the larva or young state of some reptiles which spend the early portion of their existence in the waters, and in all the fishes. The gills are placed in immediate communication with the heart, and are composed of an innumerable series of delicate bloodvessels arranged in a fringe-like form upon the lower edges of four bony arches, which form the frame work of this structure. Water entering at the mouth, is forced out again at the posterior opening of the covers, and thus maintains almost a constant stream or rush through them, entering and again expelled, at intervals, similar to the respiration and expiration of animals. When withdrawn from the water, the delicate filamentous structure of the gills immediately collapses, and no muscular exertion, or convulsive action, can restore them to their former play; when exposed to the action of air only, a kind of suffocation ensues, and death is the consequence. This is the general principle of respiration in this class of beings, but the structure and its application is often modified. The admission and exit of the water is sometimes



performed independently of the mouth ; and those species which can exist for longer periods than usual out of their native element, have the power of retaining a portion of water in a membranous sack or bag surrounding the gills, which keeps the filamentous structure moist, and enables the animal to continue the respiratory action. Such is the case with a very singular fish, the *Doras costatus*, a native of Demerara, which possesses the singular property of deserting the water, and travelling overland. In those terrestrial excursions, large droves are frequently met with during very dry seasons, for it is only at this season that they are compelled to this dangerous march, which exposes them as a prey to so many and such various enemies. When the water is leaving the pools in which they commonly reside, they simultaneously quit the place, and march overland in search of water, travelling for a whole night in search of their object. "I have observed," adds Dr Hancock, "that their bodies do not get dry like those of other fishes when they are out of the water ; and if the moisture be absorbed, or they are wiped dry with a cloth, they have such a power of secretion, that they become instantly moist again. Indeed, it is scarcely possible to dry the surface while the fish is living." \*

\* Dr Hancock, *Zool. Journ.* No. XIV p. 242.

The senses among fishes may almost be said to be confined to three,—those of seeing, hearing, and smelling, all very acute. Those of taste and touch are to all appearance in subordinate development, nor with the powerful exercise of the others are they conducive, or necessary to the existence of the individual. There is a general sense of feeling by contact with any body over the surface of the animal; but unless in those species which are furnished with long filamentous appendages to the head, there is no organ by which this property is regularly exercised. In those fish, when lying at the bottom in disturbed water, the filaments are extended, and may serve to make them aware of the approach of an enemy; and among others, in the *Siluri*, where they are of great length, and are thrown out and moved, to attract attention; from their sensibility of touch, while the fish remains in concealment, they may warn the lurker that his prey approaches, and enable him to prepare for its seizure.

The sense of taste seems even developed in a less degree, the organ in which it is generally implanted being used as an accessory to prehension, and often armed with very strong teeth. Swallowing also almost immediately follows the seizure; the prey, gorged entire, and without mastication in the mouth, is rapidly dissolved and digested in the stomach.



The important function of vision is imparted to fishes to a greater extent, and if perhaps the range of seeing be not great, when within its bounds it is apparently acute and distinct ; and as among the higher vertebrata we have some which are nocturnal in their habits, as well as those which seek their prey by day, so we find among fishes a difference of form in the large eyes of many species which constantly remain at a depth of many hundred fathoms below the surface, and where it has been proved that the influence of light could not extend. In some, again, the eyes are remarkable for their minuteness, and to several species the specific name *Cæca*, or *blind*, has been applied. These, like the mole in her dark galleries, live in the banks of muddy rivers, and are no doubt furnished with some more exquisite sense to supply their wants, and minister to their sustenance. In the *Gastrobranchus*, a fish remarkable in all its structure, no trace whatever of eyes has yet been discovered.

Water, the medium through which fishes hear, has been proved to be a better conductor of sound than air ; and from a variety of experiments, sounds produced under water, have a loud and clear impression on the human ear, placed in the same situation. In fishes there is no external ear, except in a few where a very small cavity is discernible. They want the tympanum, the small bones, and the eustachian tubes ; but the semi-

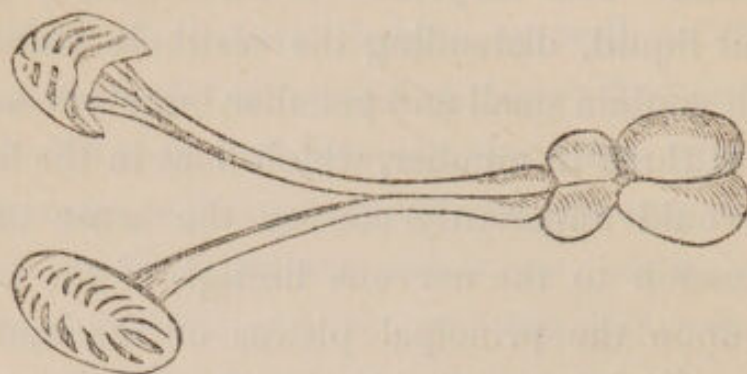
circular canals are often largely developed. In the osseous fishes, to a part of which this volume is more particularly devoted, the whole of the labyrinth of the ear projects into the cavity of the cranium. The labyrinth is filled with a transparent liquid, distending the vestibule and sack, which contain small and peculiar bony substances, two or three in number, which float in the liquid, and would apparently convey the sense of any concussion to the nervous linings of the edges, and upon the principal plexus of the auditory nerve, which is ramified in the greatest proportion on the walls of the sack, which generally contains the largest of these hard osseous bodies. The structure of the ears in fishes is certainly less perfect and less complicated than in the higher mammalia and birds; and Cuvier is of opinion, that though they hear sounds distinctly, or as concussions, yet they are unable to distinguish any of the finer tones or variations. That they are sensible of the impulses of sound has often been proved, and fish are known to approach for food at the whistle of their keeper.\*

Smelling, again, appears to be even farther developed than what is generally supposed. The

\* The Romans were even said to have taught each to approach upon calling by a particular name. Freycinet, speaking of the *Squalus melanopterus* which the expedition met with at the Waigow Islands, says they



nostrils, in general, appear externally like a double hole or opening, and the branches of the nerve are ramified on a sort of cushion at the bottom, or upon the side. The cut will shew



the great proportion of nerve supplied from the brain to the nostrils. In a few, they are like prolonged tubes, as among the eels, where the multiplicity of nervous filaments is very great; and in one fish they are remarkable as being placed on a sort of stalk like a mushroom, in which the openings are placed with the nervous distribution. Seeing, then, a certain extent of development, we cannot doubt that impressions of smell are conveyed. In proof, various perfumes are successfully used by anglers to attract the fishes. Eels are led into traps by baits placed within, which they could only discover by smell; appear to have a finer sense of hearing than of sight. When seen upon the coast, they would allow themselves to be approached, so long as silence was preserved, but on speaking, fled immediately.

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sharks will exhibit an example of the first, of the most formidable kind, of great size and strength, smooth and piercing, or sharp, but serrated. Those of the rays or skates of the second, fitted for bruising, where the food is in a great part shell fish, and where the teeth are arranged as a dense pavement. In others, again, the teeth, various in size and strength, are placed in the jaws, vomer, tongue, arches of the branchiæ, and in the throat. The latter arrangement is one of the most singular, and bears the title among French ichthyologists of “Dents en velour,” from their exhibiting the appearance, to the naked eye, of the pile of coarse velvet. These act by the compression of the lower pharyngeal muscles, and an example will be found in the genus *Cyprinus*, to which belong the greater part of those fishes which, by English anglers, are denominated “Leather Mouths.” The food being seized, is almost immediately swallowed; and, such is its voracity, that substances entirely foreign are often taken in, as may almost always be seen on examining the stomach of a cod, which sometimes presents a most heterogeneous mass, little fitted for nutrition.

Although the teeth and jaws, with pursuit, are the principal accessories for securing prey, various fishes, deprived of swiftness, entice their prey by stratagem. Such are all the *Siluri*, with long filamentous appendages to the lips, which, in some, are

said to possess the property of stinging. Others, again, lurk in concealment, and dart out upon the casual passers by. The Rostrated *Chætodon* employs a most singular property of propelling a drop of water with unerring aim and considerable force at insects which have settled on aquatic plants, seizing them on their fall into the water. But of all the properties with which these singular creatures are endowed, either for attack or defence, that of the benumbing and electric stroke of the *Torpedo* and *Gymnotus* is the most remarkable. Experiments have tended to confirm its connection with the galvanic influence. Many an assailant must be most unexpectedly stopped by it; and the fishes which are endowed with it being, in general, of slow motion, lurk until their victims approach within the influence of their deadly and peculiar power.

The fishes which possess this power are but few in number. Among the most noted are the *Torpedo* known to the ancients, and the electric *Gymnotus*. In the first, which in outward appearance somewhat resembles a skate, and has nearly the same habits, the electric organs are placed on each side of the cranium and gills, reaching from thence to the semicircular cartilages of each great fin, and extending longitudinally from the anterior extremity of the



animal to the transverse cartilage which divides the thorax from the abdomen, and within these limits they occupy the whole space between the skin of the upper and under surface. Each organ consists wholly of perpendicular columns, reaching from the upper to the under surface, and varying in their lengths according to the thickness of the parts of the body where they are placed. Their coats are very thin and transparent, closely connected with each other by a kind of loose network of tendinous fibres. The number of columns vary in specimens according to size. John Hunter found about four hundred and seventy in each organ; but in one of large size, so many as one thousand one hundred and eighty-two were counted; and the whole are supplied with a very ample plexus of nerves.\*

The Torpedo being the fish first known which possessed this property, had the fame of the immense benumbing power which it could exert spread abroad. Experiments have proved, however, that the shocks could be withstood with impunity, and that some other fishes possessed it to a much greater extent. It can be communicated through the water without contact; and is undoubtedly used in striking the prey which it

\* J. Hunter's *Phil. Trans.*

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brought about thirty with them, which they forced to enter the pool.

“ The extraordinary noise caused by the horses’ hoofs makes the fish issue from the sand, and incites them to combat. These yellowish and livid eels, resembling large aquatic serpents, swim on the surface of the water, and crowd under the bellies of the horses and mules. A contest between animals of so different organization furnishes a very striking spectacle. The Indians, provided with harpoons, and long slender reeds, surround the pool closely, and some climb upon the trees, the branches of which extend horizontally over the surface of the water. By their wild cries, and length of their reeds, they prevent the horses from running away, and reaching the bank of the pool. The eels, stunned by the noise, defend themselves by repeated discharges of their electric batteries. During a long time they seem to prove victorious. Several horses sink beneath the violence of their invisible strokes, which they receive on all sides, in organs the most essential to life ; and, stunned by the force and frequency of the blows, disappear under water. Others, panting, with mane erect, and haggard eyes, expressing anguish, rouse themselves, and endeavour to flee from the storm by which they are overtaken. They are driven back by the Indians into the middle of the water ; but a small number

succeed in eluding the active vigilance of the fishermen. These regain the shore, stumbling at every step, and stretch themselves on the sand, exhausted with fatigue, and their limbs benumbed by the electric strokes of the Gymnoti.

“In less than five minutes two horses were drowned. The eel being five feet long, and pressing itself against the belly of the horses, makes a discharge along the whole extent of its electric organ. It attacks at once the heart, the intestines, and the plexus of abdominal nerves. We had little doubt the fishing would terminate by killing successively all the animals engaged; but, by degrees, the impetuosity of this unequal contest diminished, and the wearied Gymnoti dispersed. They require a long rest, and abundant nourishment, to repair what they have lost of galvanic force; and, in a few minutes, we had five large eels, the greater part of which were only slightly wounded.”\*

The reproduction and migration of fish is another part of their history full of interest. They are, with a few exceptions, oviparous, and are fruitful to a most surprising degree—so much so, that if the whole ova were to be matured, bounds could not be assigned to them, and the expanse of the waters would be crammed; but among

\* Humboldt's *Pers. Narr.* iv. 349.



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place has been selected and finished for the deposition, or after they are hatched. There seems, however, here also to be exceptions. "The *Callichthys littoralis* makes a regular nest of long leaves, or grass, in which they lay their eggs in a flattened cluster, and cover them over most carefully. They remain by the side of the nest till the spawn is hatched, with as much solicitude as a hen guards her eggs, both male and female, for they are monogamous, steadily watching the spawn, and courageously attacking any assailant. Hence the negroes frequently take them by putting their hands into the water, close to the nest, on agitating which, the male springs furiously at them, and is thus captured." \*

In their economical uses to man, fish are principally important as an article of food, and from the employment they afford to the more dependent classes; but oil is the commodity greatest in value and quantity produced from them. The quantity of fish killed for these purposes is truly immense. Fifty thousand salmon are said to have been taken in the Tay during one year, and five hundred thousand cod, on the Newfoundland bank, by a single vessel, in a week. What then will be the aggregate of the creatures in this department of zoology which are yearly

\* Dr Hancock, *Zool. Journ.* XIV. p. 244.



consumed in our commerce? Isinglass is made from the swimming bladders; glue from the coarser refuse of fins, &c.; artificial pearls from the scales,—and Pennant tells us that a certain French artist used thirty hampers full of the latter for this manufacture in one year. Shagreen from the skins of the cartilaginous fishes, sauces from their roe, &c. may be mentioned as some of the more subordinate purposes to which they are applied.

In the arrangement of the present volume, we have preferred following the system of Cuvier. Its two leading divisions depend on the composition of the skeleton, with, however, some changes from any former arrangement. The next subordinate separation depends on the structure of the fin's rays; but the following short table will give an idea better than any exposition of our own.

#### POISSONS.

##### *Osseux.*

*A branchies en peignes, ou en lames.*

*A mâchoire supérieure libre.*

#### ACANTHROPTE RYGIENS.

Percöides.

Polynèmes.

Mulles.

Joues cuirassées.

Sciénoides.

Sparöides.

Chetodonoides.  
Scombroïdes.  
Muges.  
Branchies labyrinthiques.  
Lophioides.  
Gobioïdes.  
Labroïdes.

## MALACOPTERYGIENS.

*Abdominaux.*

Cyprinoides.  
Siluroides.  
Salmonoides.  
Cluseïdes.  
Lucioides.

*Subbrachiens.*

Gadoides.  
Pleuronectes.  
Discoboles.

*Apodes.*

Murenoides.

*A mâchoire supérieure fixée.*

Selerodermes.  
Gymnodontes.

*A branchies en forme de houppes.*

Lopobranches.

## CARTILAGINEUX ou CHONDEROTERYGIENS.

Sturiones.  
Plagiostomes.  
Cyclostomes.

Pursuing farther the system of the Baron, we shall commence our descriptive part with the characters of his first great family, the *percoid*



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*I.—Ventral fins situated under the pectorals.*

Ventrals with five soft rays.

Gills with seven rays.

With two dorsal fins, or with the first hollowed at its base.

Teeth all fine. (Dents en velour.)

1. Perca.
2. Lates.
3. Enoplossus.
4. Diplorion.
5. Labrax.
6. Centropomus.
7. Graministes.
8. Aspro.
9. Ambassis.
10. Apogon.

The canine teeth mingled with the others

1. Cheilodipterus.
2. Lucioperca.
3. Etelis.

With a single dorsal fin.

Canine teeth mingled with the others.

1. Serranus.
2. Merous.
- 3.
4. Plectropoma.
5. Diacope.
6. Mesoprion.

Teeth all fine. (Dents en velour.)

1. Centropristes.
2. Grystes.
3. Polyprion.
4. Pentaceros.
5. Acerina.
6. Rypiticus.

Less than seven rays to the gills.

Canine teeth mingled with others.

1. Cirrhites.



Canine teeth none.

1. Pomotes.
2. Centrarchus.
3. Trichodon.
4. Priacanthus.
5. Dules.
6. Therapon.
7. Pelates.
8. Helotes.

Ventral fins with more than five soft rays

Gills with more than seven rays.

1. Myripristes.
2. Holocentrum.
3. Beryx.

II.— *Ventral fins situated before the pectorals.*

Teeth all fine. (Dents en velour.)

1. Uranoscopus.
2. Trachinus.
3. Percis.
4. Pinginpes.

Canine teeth mixed with others.

1. Percophis.

III. — *Ventral fins situated behind the pectoral.*

With canine teeth.

1. Sphyræna.

Teeth fine. (Dents en velour.)

1. Polynemus.

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## THE GRANULATED PERCH.

*Perca granulata*. — Cuv. et Val.

## PLATE I.

La Perch a Tete Grenue. — *Perca granulata*, Cuv. et  
Valen. *Hist. Nat. des Poissons*, ii. 48.

D. 15—2.13; A. 2.8; C. 17; P. 15; V. 1.5.\*

THE Granulated Perch inhabits the rivers which flow from the Blue Mountains towards the Atlantic Ocean, and, with two others from the same country, is so similar to that of Europe, as to have been confounded with it, and to have assisted in the idea that the latter was also found in the New World. It indeed approaches very closely by the bands on the sides, and the red colour of the lower fins; and the distinctions pointed out by Cuvier are the stronger teeth upon the vomer, the more delicate indentations of the preopercle, and the more irregular form of the cranium. The second dorsal fin has one ray more than that of the common perch, that of the first being 2.13, the latter, 1.13.

\* The rays of the fins will be stated, as above, at the commencement of each species,—the letters signifying *Dorsal*, *Anal*, *Caudal*, *Pectoral*, and *Ventral*.

A species from Java is named *P. ciliata*, from the deeper cutting in or ciliation of the scales. Another, from Cook's Straits, differs from its congeners in being spotted on the sides, above and below the lateral line, with reddish golden-coloured spots. The body of a lengthened form, silvery, the back with green and bluish bands nearly to the lateral line. It was found to be a fish of great delicacy of flavour, and, from its resemblance to a trout in spotting and taste, was named by Forster *Sciæna trutta*.\* Cuvier has now placed it at the extremity of his genus *Perca*.

The Common Perch, however, still continues the species which is most accurately known, and, among the fishes which are used in the economy of man, was one of those which were perhaps most extensively and anciently used. It was known to the Greeks and Romans, and was celebrated for its beauty and delicacy, in the latter quality being thought worthy of contesting the palm with the far famed Mullet. In distribution, it is extensively spread over the lakes and rivers of Europe, and a part of Asia; it extends to Italy, to European and Asiatic Russia, and is found in the rivers which flow into the Baltic and Black Sea. To Great Britain it is thought to have been introduced, and is now an abundant and well

\* See detailed description, Schneider, 542, Addenda.



known fish in the southern lakes and rivers. It reaches to the north perhaps not farther than some lochs in Ross-shire, and to them it has most probably at some period been transported.

In the shape of the Perch, we find that combination of length, depth, and thickness, which will give the easiest support in, and the least resistance when passing through the water. While the fins possess great power, the swimming or air-bladder is of great size, and the scaling or outward covering is compact, hard, and not awkwardly large. In colouring it is extremely beautiful, the upper parts of a rich olive green, shading into golden yellow; the body banded with distinct bars of a deeper tint; and the whole relieved by the deep velvety black of the posterior part of the dorsal fin, and the brilliant vermilion of the ventral and anal fins. For defence, the strong spines of the dorsal fin, which are erected and held fixed with extraordinary muscular power upon the appearance of any danger, are admirably fitted, and it is one of the few fishes which is able to frequent waters in common with the Pike. A variety of the Perch is mentioned by M. Jurine, where all the colours are of a paler tint; the fins of a pale yellow, without any of their usual brilliant vermilion. Another, which Cuvier thinks may eventually resolve itself into a variety, is the fish which he has given under the title of *Perca*

*Italica*—found in certain cantons of Italy, and, in particular seasons, seen in the Boulogne markets. It is without the dark side bands, but differs also slightly in some of the proportions of the head and fins. The Wales variety, mentioned by Pennant, consists in the hunched form of the back, and the distorted form of the back-bone next the tail, which appears first pinched in, and again expands.

As an article of food or luxury, we cannot agree with its celebrator, Ausonius, in its excellency over our other fresh water fishes. When of average size, it affords a fine variety for the table, but will be surpassed in delicacy by either the Trout or Salmon. The skins are used by the Laplanders, cooked into a kind of jelly, and for making glue; and in the village of Lisse, on the Haarlem-mere, celebrated dishes are prepared from their milts; while of their scales, whitened and cleaned, many pretty ornaments have been lately made.

The general habitat of the Perch in Britain is in lakes, and streams not too rapid. They delight in a clear bottom with grassy margin, or in rivers overhung with brush, and widening into some beautiful lake-like expanse. Here they roam in shoals, descending and rising, seeking their food, and shading themselves from the too great heat among the reeds or foliage. They are rather a



stupid fish, and are easily taken with the rod at various baits — the most successful of which is, however, a Minnow. In streams where they have grown large, they afford tolerable sport; and, from the shoal feeding in company, many may be taken when it is once discovered. The average size may be stated at from one pound to a pound and a half. Those of three and four pounds are, however, tolerably common; but the one mentioned by Pennant, to have been taken in the Serpentine river, of nine pounds, appears to be still the largest upon record.\* In some of the Highland lochs, particularly those of Perthshire, they are remarkably fine and abundant.

Pallas gave the title of *Labrax* to a race of fishes found in the sea of Kamtschatka, remarkable in having several lateral lines or rows of pores upon the sides; but Cuvier, thinking the name inapplicable to a fish which was not known to the ancients, has applied it as a subgeneric title in his own arrangement, to the *Perca labrax* of Linnæus. This explanation is necessary, lest the present subgenus should be confounded with that of Pallas,

\* Bloch mentions one taken in Siberia, of which the head alone measured eleven inches in length, and was kept as a curiosity. The weight must have much exceeded those above mentioned.

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of the Basse is of considerable elegance, and the colours are chaste and pleasing, without any of the striking contrasts we have in the true Perches. The upper parts are gray, with bluish reflections, which gradually shade into a silvery white on the lower parts; the fins are gray, the pectoral ones slightly tinged with reddish. At some periods they appear to be marked with spots or clouds, which was attributed to be the colouring of the young only; Cuvier, however, found very small specimens perfectly unspotted, while some of the larger were the reverse, and he is more inclined, from his observations, to consider it a sexual difference. The extra European species amount to only four or five: to them belong the Rock-fish, or Striped Basse of the Americans—*Labrax lineatus*, Cuvier — abundant in the vicinity of New York, where it is much esteemed, and brought to the markets of a weight reaching sixty and seventy pounds. They ascend the rivers in the spring to spawn, and are then taken in immense numbers with the hook.

Another species was discovered in the bay of Offack in the island of Waigiow, by Lesson and Garnot, the naturalists to the expedition of Duperry. It is of small size, of a golden green, with brownish lines. Another species inhabits the Japanese seas.

The next sub-genus of Cuvier is very closely



allied to this. The sub-orbitary bone only is toothed; the preopercle has a spine at the angle, and very strong teeth upon the lower surface. The first dorsal fin is higher and shorter than in *Perca labrax*, and the tongue is free as in the Perch. They are in general a wholesome fish, of a large size, and inhabit the rivers of the warmer parts of the old continent. *Lates*, now adopted for the genus, was the ancient name given to some of the species. That which we shall notice is,

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## ELEVEN-SPINED CENTROPOME.

*Centropomus undecimalis*.—LACEP.

## PLATE IV.

Centropome undecimal, *Lacepede*.—*Sciena undecimalis*, *Bloch*, 305, *Auct. Cuv.*—Le Centropome brochet de mer, *Centropomus undecimalis*, *Cuv. et Valen. Hist. Nat. des Poissons*, ii. p. 102.

E. 7; D. 8—1.10; A. 3.6; C. 17; P. 15; V. 1.5.

LACEPEDE formed the present sub-genus for the reception of the subject of the accompanying plate, the principal distinctions of which are taken from the gill covers, and is named from having eleven spines in the last dorsal fin. It is abundant, and forms a large article of consumption in most parts of South America, in the French, Spanish, and Portuguese colonies; at Rio de Janeiro, Lima, and Cuba. It frequents the mouths of rivers, and even runs so far up as in some parts to be counted a fresh water species. It is every where much esteemed, appearing at the tables of the most opulent. It reaches a weight of above twenty-five pounds, and in the markets is sold in cuts or pieces, like many of the larger fish in this country. A kind of caviar is made from the roes.



From the flattened muzzle and general form of this fish there is some resemblance to the Pike, under which name, with the addition of "sea," it is in some places known. The head is narrow, and when viewed from the side, it appears still more lengthened, from the elongation of the lower jaw, which considerably exceeds that of the upper. The cheeks, opercles, and sub-opercles, are covered with scales. The dorsal fins are triangular, and separated by a larger space than we have yet seen, being in reality distinct. The first has eight, the second eleven rays. The scales are nearly round, rough upon the edges. The lateral line undulates a little near the centre of the fish, is very conspicuous, and forms a black line running the whole length of the body; it is formed by a wide and short tube pierced in each scale. The colour of the fish is silvery, tinted with brown, or greenish on the upper parts, and relieved by the deep tint of the lateral line. The first dorsal fin is gray, the others yellowish, finely dotted with black on their edges.

The next sub-genus has been named by Cuvier *Lucioperca*, or Pike-perch, from the combination which its type exhibits of the characters of the two fish. It possesses the fins and banding of the latter, with the elongated form of the head and body, and the sharp long teeth of the Pike. The best known species is

## THE COMMON PIKE-PERCH.

*Lucioperca sandra*.—Cuv. et Val.

## PLATE V.

*Perca lucioperca*, Bloch. — Le Sandre commun *Lucioperca sandra*, Cuv. et Valen. *Hist. Nat. des Poissons*, ii. p. 110.

D. 14—1.22; A. 2.11; C. 17; P. 15; V. 1.5.

THIS handsome fish inhabits the rivers and lakes of the north and east of Europe, but, according to Cuvier, is unknown in Italy, France, or Britain. It is taken in the Danube, the Elbe, and the Oder; in the Baltic, Caspian, and Black Seas, the Sea of Asoph, and is very abundant in the Volga. In this great European range, and notwithstanding its excellence as food, it appears to have been unknown to the ancients; at least none of our most skilful ichthyologists have been able to trace its presence as an article of luxury or necessity at their entertainments. It is a fish of rapid growth, and attains a length of three to four feet, and a weight of twenty pounds. Its flesh is of an agreeable taste, rich, and, when cooked, remarkably white. It is often salted and smoked, and quantities prepared in these ways are exported from both Prussia and Silesia. It



is extremely prolific, three hundred thousand ova, of about a size equal to a grain of mustard, occasionally forming the roe of a single fish. It is, at the same time, a much more tender fish than the Perch, and will not bear carriage in the same way; and it is this which, Cuvier thinks, has hitherto prevented its introduction into France, where there is no remarkable difference in climate from the countries in which it is so abundant. Would it not be possible to introduce it to some of the British waters?

The general colours of this fish, though less gaudy than those of the Perch, are chaste and simple; the back and upper parts are of a greenish gray, changing, on the sides and belly, to silvery white. In the old fish, the upper parts have dark clouded spots, but which, in the young, take the form of vertical bands. The dorsal fins are gray, and have black spots between the rays, which are so distributed as to form bands across. In the young, these spots are more clouded, and are also sparingly scattered over the head and tail. The other fins are greenish gray, in some individuals tinted with yellow. The teeth are in general small, but thick and close set; two on the upper jaw, four on the lower, and two on the fore part of each palatine bone, are of a larger and more formidable size. The internal structure of this fish nearly resembles that of the Perch.

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## THE BLACK BASS OF THE HURON.

*Huro nigricans*.—Cuv. et Val.

## PLATE VI.

Le Huron, *Huro nigricans*, Cuv. et Valen. *Hist. Nat. des Poissons*, ii. p.124.

IN the arrangement which Cuvier has proposed, some fishes were occasionally met with which could not enter into the genera already formed, while they evidently were closely allied to them ; his plan here seems to have been to arrange them at the termination of those of whose situation he had no doubt ; and such is the case with four curious species which occupy as many of our following plates. The first is the Black Bass, or Black Perch of the English residents on the banks of the Huron. Its flesh is firm and white, and it is much esteemed during summer. The upper parts of the fish are of an olive brown, changing into yellowish white on the belly, and along the central ridge of each scale is a line of the same colour with the upper parts, giving it a striped appearance on the sides. The body is rather deep in proportion, the under jaw slightly projects, and the head, cheeks, and opercles are scaled. The teeth are nearly similar to those of the Perch.

The first dorsal is much less, contains only six rays, and is placed at a considerable distance in front of the second. The anal fin is again considerably larger in proportion, and has three spiny, with eleven soft rays. The others are nearly similar to those of the Perch.

Cuvier's specimen was sixteen inches in length ; and although the fish is esteemed, and seems abundant in its native country, little is yet known regarding it. Our next fish is one of great beauty—it is



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## THE SPINED NIPHON.

*Niphon spinosus*.—Cuv. et Val.

## PLATE VIII.

Le Niphon, Cuv. et Valen. *Hist. Nat. des Poissons*.

D. 12—1.11 ; A. 3.7 ; C. 17 ; P. 16 ; V. 1.5.

INHABITS the Japanese seas, and is remarkable for the strong and formidable knife-like spines with which the opercles are armed ; indeed, the whole head is sawed and spined in a singular manner. The sub-orbitary bone has the lower edges like a fine saw ; the preopercle is sawed on its posterior edge, and strongly toothed below ; while at the angle is a large and strong dagger-formed spine, exceeding in length the edge of the opercle. Upon the opercle itself three spines rise edgeways from the surface. The super-scapular bone has two teeth, and the humerus above the pectoral fin is furnished with a flat spine. The first dorsal fin, the ventral, and anal fins, are also all strongly spined, and complete the array of this well defended species. The upper parts are of a pale brown colour, the lower parts silvery, the dark shade of the upper part is divided, in a line from the eye backwards,



by a pale longitudinal band. The upper fins are grayish, the last dorsal fin with a blackish spot on the fore part. The others are of a yellowish white, and the tail is blackish at its two angles, with a central paler line. In length, the single specimen, whence the description was taken, was about eight inches.

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part surround the body. The fins have a yellowish appearance, except the ventrals, which are blackish, of which colour, or rather of a deep gray, are the membranes between the spines and rays of all the fins.

It is abundant in the New Holland seas, but appears to reach no great size, eight or ten inches in length being the greatest which have yet been seen.

## TWO BANDED DIPLOPRION.

*Diploprion bifasciatum*.—KUHL. et VON HASSELT.

## PLATE X.

Le Diploprion, *Cuv. et Valen. Hist. Nat. des Poissons*, i. 137.

B 7; D. 8—15; A. 2.12; C. 17; P. 17; V. 1.5.

THIS singular looking fish was discovered on the coast of Java. The body is compressed, the head very large, and nearly the depth of the body, from whence the shape tapers towards the tail. The opercle is armed with three strong spines, and the preopercle has the edges toothed and serrated. The first dorsal fin is large and powerful, and contains eight very strong rays. In the other fins nothing remarkable is seen except in the ventrals, whose first and second rays are long, and extend beyond the commencement of the anal fin. The scaling is very minute. The colours are a fine reddish yellow, relieved by two crossing bands of black, the one through the eye, the other from the termination of the first dorsal fin, obliquely, to the anal; the first



dorsal fin is brownish black. This fish is only known of about six inches in length.

The next genus contains numerous species. That we have to notice is

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cheek and gill covers.\* The dorsal fins are separated, though by a less space than those of the Mulletts; the first narrow, and with strong spines. The others nearly resemble those of the Perch.

The foreign species seem mostly confined to the Indian seas, and none have yet been found in those belonging to America or Africa. A few have been met with in the New Holland seas, New Guinea, &c. particularly in the late voyages under M. Freycinet. Many of these fish are of brilliant colours, principally red and yellow; but even the more sombre marked have some decided contrast in dark coloured bands or spots, or in some markings of the fins. They all appear to be of small size; the largest which is known being only about seven inches in length. The *Apogon trimaculatus* of Lesson and Garnot is of a golden red, relieved by three black marks, placed on the dorsal fins, and on the tail. Others, again, have the dark markings in longitudinal stripes; such is the *Apogon quadrifasciatus* of a silvery red, with two dark brown bands on each side of the back; another, from the Isle of Guam, is striped with nine black bands, whence it has the name of *Apogon novemfasciatus*.

\* This minute spotting is not represented in the copy of our plate.



## ARABIAN CHEILODIPTERUS.

Cheilodipterus Arabicus, CUV. *et* VAL.

## PLATE XII.

Le Cheilodiptere Arabique, *Cuv. et Valen. Hist. Nat. des Poissons*, ii. p. 165.

B. 7; D. 6—1.10 or 1.9; P. 14; V. 1.6; A. 2.9 or 1.8; C. 17.

THE Arabian Cheilodipterus illustrates another genus of Lacepede, formed from one of Commerson's fishes, and bearing the same relation to *Apogon*, which *Lucioperca* does to the Perch. The double edged preopercle, finely serrated; the two dorsal fins far removed, and the scaling large, but easily rubbed off; while a portion of the teeth are long, sharp, and rather strong. The fish represented on Plate XII. is a native of the Red Sea, where it is frequently taken by the Arabs. The colour of the upper parts is a fresh olive green, changing on the sides and belly to silvery, deeply tinted with a reddish or rose colour. The whole body is marked longitudinally with dark lines, somewhat following the bend of the fish, and amounting in number to from fourteen to seventeen. At the insertion of the tail there is a cross band of the same colour

as the back, shading at the edges into yellowish, and in the centre of it, as terminating the lateral line, there is a round black spot. The fins are of a grayish tint, nearly formed as in the preceding fish, the first dorsal with the anterior and upper edge black. These fish seem also to reach only a small size, and all those which are yet known are banded longitudinally, as that now described. Three species only are noticed. The first has eight bands ; the second, as we have seen, from fourteen to seventeen ; and the last, discovered near the Society Isles by Lesson and Garnot, has five black bands. *C. quinquelineatus* is only four inches in length, of a silvery white ; the stripes of deep black.

Our next fish is very remarkable : it is



## THE LARGE-EYED POMATOME

*Pomatomus telescopium*.—Risso.

## PLATE XIII.

Des Pomatomes.—*Cuv. et Valen. Hist. Nat. des Poissons*,  
ii. 169.

D. 7—1.10; A. 2.9; C. 17; P. 18; V. 1.5.

THIS fish, according to M. Risso, is very rarely taken, never almost leaving the bottom of the deep sea. At Nice he was only aware of two specimens being taken during thirty years. The flesh is well-tasted, tender, and firm. It is remarkable for the immense size of the eyes, which occupy nearly the whole cheek, and is an example of that form of the organ, which we mentioned (p. 74) occurred in those species which generally kept at a depth beyond the penetration of the sun's rays, and which might be called nocturnal. Whether its sight is acute, or what peculiarities there are in the structure of the eye and its other organs, is yet a desideratum among ichthyologists, the rarity of the species having hitherto prevented examination. The cheeks and opercles are covered with scales; the form of the preopercle is remarkable in the

projection backwards of the lower angle, and neither it nor the opercles are armed with teeth or spines. The colours are a brownish violet, with blue and red reflections; the fins of a brownish black. These are of middling size, except the tail, and present nothing very remarkable. The tail is expanding and very ample, considerably forked. The length of the specimen taken at Nice by M. Risso was about twenty inches.



## COMMERSON'S AMBASSIS.

*Ambassis Commersoni*.—Cuv. et Val.

## PLATE XIV.

Des Ambassis, *Cuv. et Valen. Hist. Nat. des Poissons*, ii. 175.  
 —Genus Chonda, *Hamilt. Buchan. Gang. Fishes*, 103.

D. 7—1.9; A. 3.9; C. 17; P. 12; V. 1.5.

AMBASSIS is distinguished by the protracted mouth, the tooting of the suborbital bone, by the double edge extending round the preopercle, the serrating of the lower edge, and by the small nearly concealed spine at the insertion of the first dorsal fin. They seem to inhabit the tanks, salt marshes, and pools of India, and to fill the same place in the Indian ichthyology with some of the small *Cyprini* and Sticklebacks of Europe. The concealed spine is an approach to the latter. According to Hamilton Buchanan, they are all very small and of little value, although in many places abundant, and used in considerable quantities; but as food they are insipid, and filled with small bones, for which defects their size does not compensate.

That which Cuvier has taken to illustrate the genus is Commerson's Ambassis of the accompanying plate, one of the largest of the genus,

plentiful in the seas around the Isle of Bourbon, and found also at the mouths of the Pondichery river on the coast of Malabar, and in Java. In the island of Bourbon it is relished in soups, and sometimes preserved in pickle; and the fishing of them gives employment to many of the inhabitants.

It is a handsome and rather beautiful fish when fresh taken from the water, a silvery tint overspreading the whole body. The upper part of the back is of a brownish green, which gradually falls into a paler shade on the lower parts; and along the centre of the fish there runs a pale broad shining line, which relieves the uniformity of its colouring. The principal parts to be examined here are the serrating of the under edges of the preopercles and the first dorsal fin; the first ray is very short, the second the longest; but before either there is a small lying spine, not seen in the figure, and which can only be discovered by feeling with the finger. This fish is about seven inches in length. There is a peculiarity in the ribs of this species mentioned by Cuvier; it commences with the third pair, and each of the eight following have their upper half dilated into a small oval plate, with a longitudinal groove on the outward surface, which runs in a line with the slender part of the bone.

There are several other species of this genus



but they are all of little comparative interest. The *A. nama* is common in ponds throughout Bengal, and seldom exceeds three inches in length. *A. baculis* is found in the north-eastern parts of Bengal, and seldom exceeds an inch and a half in length; while the *A. ranga* of a similar size is found in the fresh waters of all the Gangetic provinces. The whole of these pretty little fish are diaphanous in the structure of the skin and sides, that the muscles, ribs, and even the intestines, can be traced; and the intensity of their bright colouring is from this cause considerably weakened.

## THE ZINGEL.

*Aspro vulgaris*.—Cuv. et Val.

## PLATE XV.

*Perca asper*, *Linnaeus*, *Bloch*.—L'apron properment dit,  
*Cuv. et Valen. Hist. Nat. des Poissons*, ii. p. 188.

B. 7; D. 8—1.12; A. 1.12; C. 17; P. 14; V. 1.5.

THE little fish forming this genus is at once distinguished by the lengthened form of the body, and by the situation of the mouth, which is almost placed under the snout or nose, that part being rounded and projecting over it; it is also remarkable for the roughness of its scales, whence by Rondoletius it was said to receive its name of *Asperus*. It is found in the Rhone and its tributaries, but is not known in the rivers on the west of France. It is also said to be found in the Danube, while other ichthyologists assert, that it is to be met with in some of the Russian streams. It seldom exceeds six or seven inches in length, but is used at table, and is esteemed good and delicate. By the fishermen of the Rhone, it is



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## THE ORIENTAL GRAMISTES.

*Gramistes orientalis*.—BLOCH.

## PLATE XVI.

*Gramistes orientalis*, *Bloch*.—Le Gramiste oriental,  
*Cuv. et Valen. Hist. Nat. des Poissons*.

D. 7—1.13; A. 3.8; C. 17; P. 14; V. 1.5.

GRAMISTES is the last genus of the Perches with two dorsal fins, or where there is a visible separation between the spined and soft parts. That established by Bloch contained several species; by Cuvier, however, it is restricted to the fish of the accompanying plate, the only one yet discovered. It approaches nearest in structure to the *Rypticus arenatus* of Plate XXX, but is at once distinguished by the double dorsal fin. The present fish was described long since in the work of Seba. It is of small size, not exceeding five or six inches, and, when newly taken from the water, seems without scales, which are very small, but appear on the skin being dried. The opercle has three short spines. The markings of this fish are very singular: the ground colour is a brownish black, with longitudinal lines of white on each side, generally



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## PERCHES WITH A SINGLE DORSAL FIN.

WE now come to the second great division of the Percoid Fishes, characterized and known at first sight by the simple character of a single dorsal fin, no separation appearing between the spiny and softly rayed part. The sub-divisions, it will be seen, are taken from the opercle, pre-opercle, teeth, and jaws. The first genus is *Serranus*, containing a numerous series of species, almost all of them remarkable for the beauty of their tints and singularity of marking. Cuvier has separated them into three sections: the first have the jaws naked, and they are of a small size; the second are fish of greater size, and have the under jaw scaled; and the third, of middling size and lively colours, have the head and jaws covered with scales similar to those of the body. The first we shall notice is a beautiful fish from the Mediterranean Seas, the



## LETTERED SERRANUS

*Serranus scriba*.—Cuv. et Val.

## PLATE XVII.

*Perca scriba*, Linnæus.—Le Serran ecriture, Cuv. et Valen. *Hist. Nat. des Poissons*, ii. p. 215.

D. 10.14; A 3.7; C. 17; P. 13; V. 1.5.

THIS beautifully marked fish is found on the coast of Provence, Malta, and Naples, besides other parts of the Mediterranean. The general ground tint of the skin is a reddish orange, sometimes inclining to olive, and shading to a pale tint on the lower parts. The back is banded as in the perch, with dull brown bands which gradually lose themselves after passing the middle of the fish; but the most showy marks are the narrow irregular lines of rich blue which run on the nose below the eyes, and on the cheeks, which assume the form of some written character, and which have given occasion to the name of *scriba* being applied to it. The ground colour of the fins, except the pectoral, is gray, spotted sometimes with reddish orange, and sometimes with purple. On the spiny part of the dorsal fin these marks take the form of a blotch, or large spot, near the tip of each spine; but in the others they are disposed in transverse rows

upon the membrane, and have a regular appearance; the pectoral fin has the ground colour of a gamboge yellow.

These fish can never be seen in perfection, except when newly taken from the water; then their beauty is fresh and delicate, but in a few minutes it changes, even as soon as the fish dies, and the keeping for a day, or preservation in spirits, destroys all but the traces of where the delicate markings existed. They appear very different, also, according to their age, and the season at which they are taken. The present species scarcely ever exceeds half a pound in weight, and is to be seen in the markets at almost all seasons, being esteemed as an article of food. It feeds on small fish, and marine animals; but a species of cuttle fish, (*Sepia octopoda*,) is said to be among its most favourite prey, being even watched for, and the tentacula seized so soon as they are protruded from the hole where it is hid.

There is a circumstance in the economy of this fish, which merits observation, and even farther examination. It is asserted by Cuvier, who cites, in addition to his own observations, those of Cavolini, that the milt and roe are combined in one individual, and that the fish are in fact hermaphrodites. The milt, or body supposed to be so, is placed at the lower part of each roe or ovarium, growing and increasing with that organ,



and appearing small and imperfect at the season when the spawn was little advanced. Fish with a milt only, appear not to have been met with, and even among the ancients, to whom the fish was known, it was an accepted opinion, that females only existed.

Another Mediterranean species is the *Perca cabrilla* of Linnæus, distinguished from the last by the want of the inscription-like markings on the head, but having three or four oblique bands on the cheeks, and longitudinal stripes on the body, of a bright vermilion. It has also the deeper transverse bands on the body, bright spots and bands on the fins, and is altogether a fish of as great beauty as the preceding. It is commonly taken in the Mediterranean. A curious species from the north-west of New Guinea is described in the voyage of Freycinet, nearly white, with a black line running along the centre; and another species is mentioned by Cuvier, which has the skin which covers the preopercle nearly without scales—the *Serranus gymnopareius*.

Our next fish represents the form of Cuvier's second division of this great genus, with the head and jaws strongly scaled, and called by him *Barbier*; except in this character, they are nearly allied to the last.

## THE SPINED SERRANUS.

*Serranus anthias*.—CUV. et VAL.

## PLATE XVIII.

*Anthias primus*, *Rondoletius*.—*Labrus anthias*, *Linnaeus*—  
*Le Barbier de la Méditerranée*, *Cuv. et Valen. Hist. Nat. des Poissons*, ii. p. 250.

D. 10 or 11—1.5; P. 17; V. 1.5; A. 3.7; C. 17.

THE colour of this beautiful fish is a brilliant red or scarlet, which, on the sides, assumes a golden tint, and on the belly becomes pale, or almost silvery. Upon the sides of the head are three bands of golden yellow, none of which pass the gill covers except the lowest, which reaches nearly to the insertion of the pectoral fin. On the forehead there are transverse bands of bronzed green, and at the base of the dorsal fin along the back there are ten or twelve small spots of the same colour. The fins are all tinted with red and yellow; the dorsal fin has a border of the latter colour. The spiny part of this fin has sometimes ten, sometimes eleven spines, very strong—the third exceeding all the others in length by nearly a half. It is from a supposed resemblance of a portion of this spine to a razor, that the French



have applied the title of "Barbier." The ventral fins have the rays very long, reaching nearly to the middle of the anal. It is found every where in the Mediterranean, and is in many places abundant. In size, it never reaches a foot in length, and is most generally from five to seven inches.

There is little doubt of this fish being known to the ancients; and it was rendered sacred among the divers for marine productions, from the supposition that no formidable fish would approach its retreats. When caught by a hook, they were said to be immediately relieved by the rest of the shoal cutting the line with their sharp spine. A much larger fish has been confused with this, and has had attributed to it great prowess in destroying sea monsters, and wounding the fishermen when taken.

A Brazilian species is so similar as scarcely to be distinguished. It differs in the rays of some of the fins, thus, D. 10.12, and C. 3.6, and Cuvier has applied the name of *S. tonsor*. Another species placed in this division, but which does not agree entirely in all the characters of scaling about the jaws and head, has been named *S. oculatus* from the very large size of the eyes. The colour is a rich golden rose. It is found in the vicinity of Martinique.

We now come to far the most numerous division of this section, those which have the under

jaw only covered with very small scales, to which Cuvier has given the name of *Mérous*. One of the largest of this division, the *Perca gigas* of Brunich, by the older ichthyologists was scarcely if at all known; and by those of the present day comparatively little, except that the form has been ascertained. It is a fish which attains to a weight of sixty pounds, and is sometimes taken when approaching the coasts in spawning time. It occurs in the Mediterranean, and is esteemed in some places for the table. The general colour is brownish, varying to a deeper shade, or tinted with more yellow according to age, and the body is clouded or marbled over with deep blotches of gray. Another species, reaching nearly an equal size with the above, was discovered by Geoffroy St Hilaire on the coast of Egypt; but it differs in the beautiful colouring with which it is adorned, being of a deep green, shading to white on the lower parts, and upon the back, sides, and fins, varied with markings of a clear and fresh tint of the same colour. It has been named *Serranus æneus*, Geoffroy. Some species from the Indian Seas are very remarkable for the diversity and beauty of their tints. But the most remarkable fish which Cuvier has placed in this division is the



## LONG TAILED SERRANUS.

*Serranus phæton*.—Cuv. et Val.

## PLATE XIX.

Le Mérou paille en queue, *Cuv. et Valen. Hist. Nat. des Poissons*, ii. 309.

D. 9.11; A. 3.9; C. 14; P. 17; V. 1.5.

THIS fish has been figured from a specimen in the Jardin du Roi, where it exists without any note of its habits or native country. It is in length about six inches, and in its dried state is of a uniform dull tint. The singular character of this fish is in the tail, which has the two centre rays lengthened, and held together by a membrane which covers them like a sheath, and which extends into a narrow filament equalling the body in length.

## LARGE FINNED SERRANUS.

*Serranus altivelis*.—Cuv. et Val.

## PLATE XX.

Le Mérou à hautes voiles, *Cuv. et Valen. Hist Nat. des Poissons*, ii. p. 324.

D. 10.19; A. 3.10; C. 17; P. 16; V. 1.5.

THIS delicately coloured species is placed at the commencement of a group characterized by having markings on the body more or less spotted. The general tints are unobtrusive, being of a yellowish brown, the fins grayish, but relieved by the distinct spotting, which is distributed over both. It is chiefly remarkable for the height and size of the dorsal fin, particularly the posterior or soft rayed part of it. It inhabits the Javanese Seas, but nothing farther appears to be known regarding it.

Cuvier still farther sub-divides the above section, by placing together all those *Serrani* which have the same distribution of spotted markings, but they become so very small as to be almost like points. One of the more remarkable with this colouring is a fish, also from the Javanese Seas, entirely of a fine red, or orange, spotted



over with minute clear blue ; the spiny part of the dorsal fin bordered with orange ; the soft portion, and all the other fins, bordered with the same blue as that of the spots. It will stand as the *S. cyanostigma* of Kuhl and Von Hasselt. Another equally so is the *S. myriaster* of Russel, of a brownish purple, and also covered with a thousand stars of transparent blue. Another curious fish is entirely of a brick red, with numerous white spots, and, in addition, is marked transversely with six bands of black, whence it has been termed *S. sexfasciatus*.

Before quitting this genus, or rather great division, it may be remarked, that in the lining, spotting, or banding, which so curiously and beautifully diversify the skins of these fishes, blue is one of the most prevailing colours. A half nearly are so marked, while it will be seen continued in the next fishes, (Plate XXII.) which Cuvier has placed in a small genus, and which, he remarks, he only separates for the sake of simplifying the nomenclature. This has all the characters of *Serranus*, but differs in having the edge of the preopercles, around and below the angle, divided into teeth, varying in size, directed obliquely forward, and somewhat resembling the teeth or points in the rowel of a spur, whence he has named the genus *Plectropoma*.\* The scales

\* πλῆκτρον, a spur ; πῶμα, a covering.

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## LEOPARD-SPOTTED PLECTROPOMA.

*Plectropoma leopardinus*. — CUV. *et* VAL.

## PLATE XXI.

*Holocentrus leopardus*, *Lacepede*.—Le Plectropome leopard. *Cuv. et Valen. Hist. Nat. des Poissons*, ii. p. 392.

D. 8.11; C. 2.8; C. 1.5; P. 14; V. 1.5.

IN this we see the continuation of the minute spotting of the last division of the *Serrani*. It is entirely of a yellowish brown, thickly covered on the upper parts with brown or reddish spots. It is from the Indian Seas, and reaches a considerable size.

In the second division, with the ascending edges of the preopercle finely toothed, is the

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and which refers to a nitch or cut into the edge of the preopercle, into which is fitted a projecting tubercle. The mouth is furnished with teeth of considerable size, mixed with those which are concealed. Some species are of great beauty. The *Diacope Sebæ* reaches a size of three feet in length, and is entirely of a yellowish tint, with three conspicuous bands of a deep and bright red.

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times the commencement of a fifth, where the yellow begins to shade into the white.

The *D. macolor*, described in Duperry's Voyage, is one of the most remarkable for contrast of colouring; the upper part of the body is black, but relieved with large white spots, while the sides and belly are of a silvery white, interrupted by a black band. It is an inhabitant of the New Guinea seas.

*D. sanguinea*, Ehrenb. is a species from the Arabian Gulf, of a small size, and entirely of a rich red, so that among the considerable series of species which this genus embraces, we find a colouring equal in brilliancy to any of the *Serrani*, which are so remarkable for their fine tints. Different shades of red, with yellow and blue, are the prevailing colours; many of these fish are esteemed as an article of food, and from the large size of some of them, they may at some period yield a more profitable fishing, than, from their limited consumption, they do at present.

Another series of fishes have been separated from those under the name of *Mesoprion*,\* so named from having an arrangement of teeth in the centre of each side of the head in the form of a saw; they are closely allied to the last named

\* μέσον, middle; σείων, a saw.

by the notch in the preopercle, and the tubercle or swelling in the inter-opercle. Many of them are of brilliant colours, and a considerable number are remarkable in having a conspicuous black mark upon the lateral line, placed generally not far from the tail.



## ONE SPOTTED MESOPRION.

*Mesoprion uninotatus*, CUV. et VAL.

## PLATE XXIV.

Le Mesoprion dore, *Cuv. et Valen. Hist. Nat. des Poissons*, ii. p. 449.

D. 10.12; A. 3.8; C. 17; P. 16; V. 1.5.

THE one spotted Mesoprion is a native of the American seas, and is one of the most beautiful; the back, upper part of the head, and cheeks, are of a rich steel blue; the lower part of the cheeks and sides of a rich rose colour, and the belly silvery; the whole body is striped with seven or eight bands of a golden colour, on the dark part of the back irregular and disconnected. The dorsal fin has three yellow bands on a rose-coloured ground, and the others are gamboge yellow. The colouring is subject to considerable variety in tint, from golden orange to silvery. It seldom exceeds a length of thirteen or fourteen inches.

The members of this genus are of an elegant form, and are as remarkable for the richness and lustre of their colours as any of the preceding. They live solitary in the seas around the isles of India, China, and Japan, concealing themselves

in the chinks and clefts of rocks, and only leave their dull retreats in the finest weather to prey on the tender molusca, with which these seas so thickly swarm.

Many of these fish attain a very large size, and are much esteemed. Such is the *M. vivanus*, reaching a weight of forty pounds; and such also is the



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## THE RUFFE.

*Acerina cernua.*

## PLATE XXVI.

*Perca cernua*, *Linnaeus*.—The Ruffe, *Pennant*, *Donovan*.  
 —La Gremille commune, *Acerina vulgaris*, *Cuv. et*  
*Valen. Hist. Nat. des Poissons*, iii. p. 4.

D. 14.12; P. 13; V. 1.5; A. 2.5; C. 17.

WITH this beautiful little fish Cuvier commences his division of the "Percoid fishes," having a single dorsal fin, but with seven rays to the gill covers, and where the teeth are all equal. His first genus is *Acerina*, which differs from any of the preceding ones by the cavities in the bones of the cheeks and jaws. They all inhabit the fresh waters, and that now represented may be held as typical; and, being a native of Britain, and abundantly dispersed over the lakes and rivers of northern Europe, will not be difficult to procure for examination.

The Ruffe is found in several of the English streams,—the Gare in Norfolk, the Birny in Merionethshire; and though not attaining a size above five or six inches, is much esteemed for



the delicacy of its flesh. They are gregarious, are generally taken with the rod, in the same way that perch fishing is practised in the south, and in favourable days six or eight dozen are taken at one stand. The colours of the Ruffe are golden green, inclining to olive brown on the back, and silvery towards the belly, with clouded spots over the head and back. The spiny part of the dorsal fin is spotted with black on the membrane between the rays, the soft portion of it, and the tail upon the rays themselves. The lower fins are whitish, tinged with red. In the internal structure, it resembles the Perch. Two other species are found in the European rivers, one in the Danube, and another in the Don and Dnieper. The first, *Acerina*, Schraitzer, grows to a size of eight or nine inches, and is of nearly similar colour with that of Britain. The other is also somewhat similar, but is thickly spotted on the sides with black. Both are esteemed for their delicacy.

Following the Ruffes, Cuvier has placed the genus *Polyprion*, formed from a single species, common in the Mediterranean, remarkable for the large size it attains, and still more so for being long undescribed by ichthyologists. It is the

## MANY-SPINED POLYPRION.

*Polyprion cernium.*

## PLATE XXVII.

*Valenciennes, Memoirs des Mus. xi. p. 265.*

B. 7; D. 11.11 or 12; A. 3.8 or 9; P. 17; V. 1.5.

THIS fish reaches a length of five or six feet, and sometimes a weight of one hundred pounds. The flesh is esteemed, being white, tender, and well tasted. It seems common in the Mediterranean from the accounts of MM. Risso and Valenciennes;\* according to the former, it is frequent in the Sea of Nice, where it is found at so great a depth as three thousand feet, delighting in a rocky bottom. The head is slightly flattened, and strongly marked with numerous rugged protuberances on various parts. The preopercle is strongly and irregularly toothed, and a sharp ridge crosses the opercle from the upper articulation to the point, which is also sharp.

The colour of the old specimens is a uniform

\* Memoirs des Museum, xi. p. 265.



grayish brown ; the tail bordered with whitish. The young are clouded with large irregular dark spots, on a grayish white or reddish ground. The flesh is white and well tasted. According to Forster, it is also an inhabitant of the Pacific Ocean.

Next to this is placed another singular fish, which we have represented in the vignette of the title page which accompanies this volume. It is the *Pentaceros Capensis*, a native of the Cape of Good Hope, and one specimen only is known in the collection of the Netherlands. According to Cuvier, its resemblance to the genus *Ostracion* of Linnæus is considerable, having the triangular form, and hard closely joined scales, and also the horns or protuberances which are seen in these fish ; the line of the back is arched and bending, that of the lower parts nearly straight in the centre, but curved before and behind. The head and cheeks are strongly striated with rough granulated rays. In the centre of the bones of the nose, and on each side above the eyes, there is a compressed plate which rises in the form of a blunt horn ; behind the cranium there is a sort of collar of seven plates. On the centre one, nearly in the middle of the neck, rises a third small protuberance, while on the two outside plates, which are analogous to the supra-scapulary bones, rises another, making in whole five horn-like eminences,

whence the generic name has been derived. The spines of the first dorsal fin are very strong. The colours seemed a silvery yellow, or greenish, mottled with deep brown, and which latter tint occupied nearly the whole back. The length is about three inches.



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## THE SALMON-FORMED GROWLER.

*Grystes salmoides*.—Cuv. et Val.

## PLATE XXIX.

Le Growler Salmoide, *Grystes salmoides*, Cuv. et Valen.  
*Hist. Nat. des Poissons*, iii. p. 54.

D. 10.13 or 14; A. 3.11 or 12; C. 17; P. 16; V. 1.5.

GROWLER is the provincial American name for this fish, which Cuvier thinks has been given from some noise or croaking sound uttered by it. Two fish only have yet been discovered which will rank under its character; the present, a native of North America, and another procured from the New Holland Seas. In form of the body they somewhat resemble the last, but are at once distinguished from them and the preceding forms we have seen, by the smoothness and the want of any covering upon the head; the opercle and preopercle having neither spines nor teeth on their margins.

The present species, a native of the North American rivers, and abundant in the neighbour-

hood of New York, has been named *Salmoides* from its resemblance to the Salmon or Trout, being in some parts termed "Trout." It reaches a length of two feet, is of excellent flavour, and is much esteemed as an article of food ; and it also affords sport to the angler, taking the hook eagerly. The general colours will be best seen from the plate, an unobtrusive tint of olive lightening towards the under parts, where it becomes grayish white. The first dorsal fin is weaker in proportion than most of the forms we have already seen, but the last rises high behind, and assumes a shape somewhat like that of some of the Greylings. The tail is shaped a good deal like the *Salmonidæ*, and in this fish has a dark bar across the centre.

The New Holland species is found in Macquary river, and in form resembles the common Perch, but the bony opercle is furnished with a very slight pointed spine. The colour of the preserved specimens was a greyish violet, paler beneath, with irregular blackish clouded spots.

The next of Cuvier's forms is



## THE BRAZILIAN RYPTICUS.

*Rypticus arenatus*.—Cuv. et Val.

## PLATE XXX.

Le Savonnier sable, *Rypticus arenatus*, Cuv. et Valen.*Hist. Nat. des Poissons*, iii. p. 65.

D. 3.26; A. 14; C. 15; P. 14; V. 1.5.

THESE fish are characterized by having very minute scales, covered with an epidermis; by the dorsal fin having but a very small number of spiny rays, and in its not being notched or having any distinction between the spined and soft rayed portions. Both the opercle and preopercle are spined, and are without any serrating or teeth on the edges. They have been named "Savonnier" by the French, from the soft soapy and unctuous matter with which the skin is lubricated, and which, when rubbed on the hands, has a feel similar to that of soap. The most common species is found in the seas of the western parts of America, and is of a length of eight or nine inches, and generally of a blackish violet colour.

The second species, closely resembling the first, represented on the accompanying Plate XXX, is found in the Brazilian Seas, and is of a greyish sandy colour, spotted over with small darker coloured specks.

This is the last form among the percoid fishes which we shall be able to illustrate in the present volume ; and upon inspecting the table of genera, (page 89,) it will be perceived that nineteen additional forms remain, to which must be added other four, which Cuvier found it necessary to introduce after the construction of his table, leaving twenty-three, or nearly the half of this great family, unnoticed. In order to follow out our plan, and make each volume as complete as possible by itself, independent of its predecessors or followers, we shall shortly notice the remaining divisions of the family, and add one or two species which have been found in a fossil state. We shall proceed in the order of the table :—

The genus *Cirrhit*es of Commerson, follows our last. The species approach nearest to *Mesoprion*, have the preopercle toothed on its rising edges, and the opercle terminated by a flat angle ; but the character which distinguishes them is in the structure of the pectoral fins, which have the six or seven lower rays of each fin strong and lengthened beyond the others, without membranes



between the projecting parts. Most of the known species are from the Indian Seas, though one or two have also been found in the South Pacific by the latest voyagers. *C. fasciatus* of Cuvier from the vicinity of Pondichery, will stand as a good example of this form, of a pale colour, but banded transversely with dull violet. The five lower rays of the pectorals are elongated.

The next is a genus which Cuvier formed after the construction of the table at the commencement of this volume, and which must be inserted. It is without canine teeth, and contains only one species *Chironemu Georgianus*.

The next two forms of the table are somewhat allied, and are both natives of America. The first, *Pomotis*, represented in the Pond Perch of the American rivers, is characterized by the prolongation of the opercle, from which Cuvier has formed his generic name, wishing to convey the idea of similarity to the ear. The most common species is the *Labrus auritus* of Linnæus, being abundant in dams for mills, and the still waters of many parts of North America. It is of unobtrusive colours, but conspicuously marked with a large black spot, occupying the elongated angle of the opercle, and which is bordered above with white, below with reddish.

*Aphredoderus*, Lessueur.—Two edges of the suborbital bones toothed, furnished with raised spines; edge of the preopercle toothed, the angle of the opercle with a spine; the anal fin without spiny rays. A single species only known—a native of the fresh waters of North America.

*Centrarchus*—has the preopercle entire, but the angle of the opercle is divided into two flat points. The most characteristic distinction, and that whence the name is taken, is in the anal fin having numerous spiny rays, amounting to five or six, while, in the other genera, they rarely exceed three. They are found in the fresh waters of North America. By Lacepede, they are placed in the genus *Labrax*, while, by the American ichthyologists, a genus has been formed entitled *Cychla*.

*Priacanthus*\*—is distinguished by the scaling of every part of the mouth, jaws, and cheeks, in which they resemble *Anthias*, but they want the canine teeth, and have fine teeth on both jaws, a little tuft before the vomer, and a narrow line on each palatine bone. The posterior opening of the nostril is a large vertical slit; the lower angle of the preopercle is spined. Ten or eleven species

\* *Trichodon* will be found in another place.



are known, inhabitants of the ocean, and variously distributed. Many of them possess brilliant colouring.

*Dules* — resembles *Centropristes*, but has only six rays in the gill membranes. The opercle is spined. Several species are known, and there is a slight distinction in one portion having the dorsal fin perfectly entire, whereas the others have a slight notch or division between the spined and soft parts. An example of the first will be found in *D. auriga*, a native of the Brazilian Seas, so named, or by the French “cocher,” from the third spine of the dorsal fin being much elongated, and supposed to resemble a whip. Of the other division, a species from Java will shew the form, *D. marginatus*, a small fish, of delicate silvery colouring, and having the second dorsal fin tipped, and the tail doubly banded at the end, with deep black.

*Therapon* — has the anterior row of teeth upon the jaws stronger than the others. Before the vomer there is a single row, which fall with facility when touched. The dorsal fin is deeply cleft; the preopercle and suborbitary bones are toothed, and the opercle is terminated by a spine stronger than almost any other of the family. The swimming bladder is contracted in the centre, a

circumstance not common among Cuvier's Percoid Fishes. The greater numbers are found in the Indian Seas.

*Datnia*—differs from the true *Therapon* in the form of the body being much broader, or the outline raised; the jaws pointed; no teeth on the palate, and in the spines of the first dorsal fin being extremely strong. Two species only are referred to this form by Cuvier—found in the rivers of India. The *Cuius datnia* of Hamilton Buchanan, from the Ganges, will serve as an example.

*Pelates*—has the dorsal fin of a more equal size; the opercle with two weak spines, scarcely passing the membrane, and no teeth on either the vomer or palatine bones. Three species, from the New Holland Seas, seem all that are known, characterized by comparatively small scaling, and by the body being marked by longitudinal dark bands. Their discovery is due to MM. Lesson and Garnot.

*Helotes*—is distinguished principally by the outer row of teeth in the jaws being divided into three points. The preopercle is finely serrated, and the opercle has a single weak spine. Contains a species, discovered by Guoy and Gaymard in the



New Holland Seas, *H. sexlineatus*, and characterized, like the last, by longitudinal bands of a deep colour.

*Trichodon*. — In this place Cuvier, in his Appendix, directs that *Trichodon* and *Sillago* should be placed. They vary from those immediately preceding in the dorsal fins being separated from each other, as in the first division of the family, and the first has a certain resemblance to the genus *Trachinus*. The preopercle has four or five very strong teeth or spines, and the opercle is finished by a flat plate; the skin is without scales. One species only is known, *T. Stellerii*, found on the coast of Kamtschatka, and particularly round the island of Unalaschka. It is well known to the inhabitants, who take them when burrowing in the sand like the Weavers. The females deposit their spawn in furrows of the sand, and are remarkable in being said to attend the young after they have been hatched.

*Sillago* — is of an elongated form, the mouth small, but the upper jaw rather protracted; the preopercle is toothed on its rising edge, and beneath bends under, so as almost to touch that on the opposite side when the animal is in a state of rest; the opercle is terminated by a single sharp point. The dorsal fins are separated from each

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they are generally of very bright and gaudy colouring.

*Beryx*—has many of the bones of the head serrated. The eye is extremely large, but the easiest seized character, in conjunction with the serrating on the head, is the form of the dorsal fin, placed near the centre of the body, and appearing single, without any interrupting notch; the separation is only observable in the composition of the rays from spiny to pointed. Two species are described; one is from the New Holland Seas.

*Trachichtys*, Shaw.—Characterized by Dr Shaw from a single specimen found in the New Holland Seas. A single dorsal fin; the spines of this and the outer ones of the tail strong and rough; opercles with a large rough spine; the belly with large projecting plates. The whole fish remarkable for the rugged nature of its covering—whence the name.

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The arrangement of the next fishes depends upon the situation of the ventral fins, the dorsal being either double or single. The first have the ventrals placed on the throat or jugulum, or in advance of the pectorals.

*Trachinus*—is of a lengthened form, having the first dorsal fin short, and capable of deflection; the second lengthened, and with numerous rays. The anal fin stretches nearly the whole length of the body; the opercle is spined; the eyes placed near the horizontal surface of the head. They inhabit the European Seas, and are well known to the fishermen for the wounds inflicted by the spines of the first dorsal fin.

*Percis*.—Closely allied to the last. The head more depressed. The dorsal fins completely united; spine of the opercle small. Several species from the Indian, African, and New Holland Seas.

*Pinguipes*.—Head more lengthened than in the last. The teeth strong, and slightly hooked, covered by fleshy lips; the dorsal fins connected, and regularly arching; the ventral fins very fleshy. Inhabits Brazilian Seas.

*Percopis*.—The form extremely lengthened. Dorsal fins distant; the teeth in the jaws strong and hooked; under jaw exceeding the upper in length; opercle and preopercle without teeth or spines. A single species discovered in the Brazilian Seas in the voyage of Freycinet



*Uranoscopus*.—The head disproportionally large and square; the mouth opening vertically; the eyes placed on the upper part of the head; the scapular bone furnished with a strong and rough spine; the dorsal fins united; the pectorals very large;—these are the principal characters of this singular-looking fish. The swimming bladder is wanting, and the scaling is small. They are found in the European, Indian, and New Holland Seas, and exhibit some of the most grotesque forms among fishes.

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The next fishes are distinguished by having the ventral fins placed immediately behind the pectorals.

*Sphyræna*.—Similar to *Percophis* in form. The teeth strong; the under jaw projecting; the dorsal fins widely separated, and both of five rays.—*Esox sphyræna* of Linnæus will serve as an example. Several species, chiefly from the American and Indian Seas. The Mediterranean species reaches a length of three feet. Several of the species are poisonous when eaten.

*Paralepis*.—Also of the lengthened form of the last. The under jaw elongated; but the form is chiefly characterized by the very backward

position of the dorsal fins, both of which are small, the last with the rays extremely delicate. Three species known inhabit the Mediterranean, discovered by M. Risso.

*Polynemos*.—The head entirely scaled; the preopercle toothed; the scales easily deciduous; the dorsal fins far separated, and, with the anal fin, covered with scales; before the pectoral fins there are long filamentous appendages, varying in their numbers in different species. The species are numerous, and of varied distribution. Some are much esteemed for food.

*The Mulletts*.—These fish, separated by Cuvier into two divisions, have been placed at the end of the Percoid fishes in an appendix, in a kind of indecision as to their proper station, but as nevertheless bearing a resemblance to them. They are distinguished by their separated dorsal fins, their large scales easily rubbed off, and by the filaments attached to the lower jaw. The first division is

*Mullus*, Linnæus.—Comprehending the far-famed "*Mugil*" of the ancients. Characterized by no teeth on the upper jaw, no spine on the operculum, and no air bladder. Three species are described by Cuvier, and in the *Tournaïtica* of



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which occurs to the student of fossils to trace, unravel, and restore the different parts of animals which apparently have so long since ceased to exist. The first is a species from the genus *Lates*, Cuvier, (described p. 101,) and of which a considerable number of species in a fossil state are already known; it is the



*Lates gracilis*. — AGASSIZ.

PLATE XXXIII.

So named from the apparently more than usually slender appearance of the body, notwithstanding the flattening which it may have received. It is from the calcareous schist of Monte Bolca, where it is found in great abundance. The scales are smaller than in any of the living species, but do not otherwise differ. Other two fossil species of this genus are also described from the same locality, one of which has yet only been found in this deposit, while a fourth, *L. macrourus*, is noticed from the vicinity of Sevres. Our second example is the

*Cyclopoma spinosum*. — AGASSIZ.

PLATE XXXIV.

A genus formed for the reception of two species only yet found in a fossil state, and principally characterized by the very strong spine at the angle of the opercle, and the strong armatures of the preopercle, both of which are distinctly seen in the accompanying representation. Both species are from the schist of Monte Bolca.

Of the discoveries of fossil fishes, in the middle districts of Scotland, we hope to lay before our readers some particulars in another volume of this work. In the mean time, it may be remarked, that for a time it was believed that among the fossil fishes of the Edinburgh division of the middle district of Scotland, there were teeth, scales, and other parts of *saurian* animals; in short, that formerly we had, as natives of Scotland, creatures of the crocodile kind. It has lately, however, been proved, that these teeth and scales were parts of true fishes, and that hitherto no remains of saurian animals had been discovered



in any of the quarries near Edinburgh, a view of the subject which was confirmed by the experience of Agassiz, while on his visit to Scotland during the meeting of the British Association, in September last. Upon an examination of the limestone quarries, the genus discovered to abound in them in the greatest profusion was *Palæoniscus*, Agass.; and a new species has been named *P. Robisonii*, in honour of Mr Robison, secretary to the society which, by its endeavours, has rescued so many of these relics from destruction. Another fossil, entirely of a new genus, has been named *Eurynotus creantus*; and a third, the first which was discovered, has received the title of *Pygopterus Bucklandii*. The immense bony rays found in the same quarries are also referred to fish; and a new genus has been provisionally named *Gyracanthus*. The teeth, scales, and large bones, which gave rise to the idea that they belonged to a saurian animal, have been considered by Agassiz as *sauraid*, that is, resembling those of an animal of this kind not really belonging to it; and he refers them to some fish allied to *Lepidosteus*, which unites the characters of the crocodilean animals with those of fishes, and in an existing species of which that naturalist has lately been able to demonstrate, that the swimming bladder of fishes performed, to a certain extent, the office

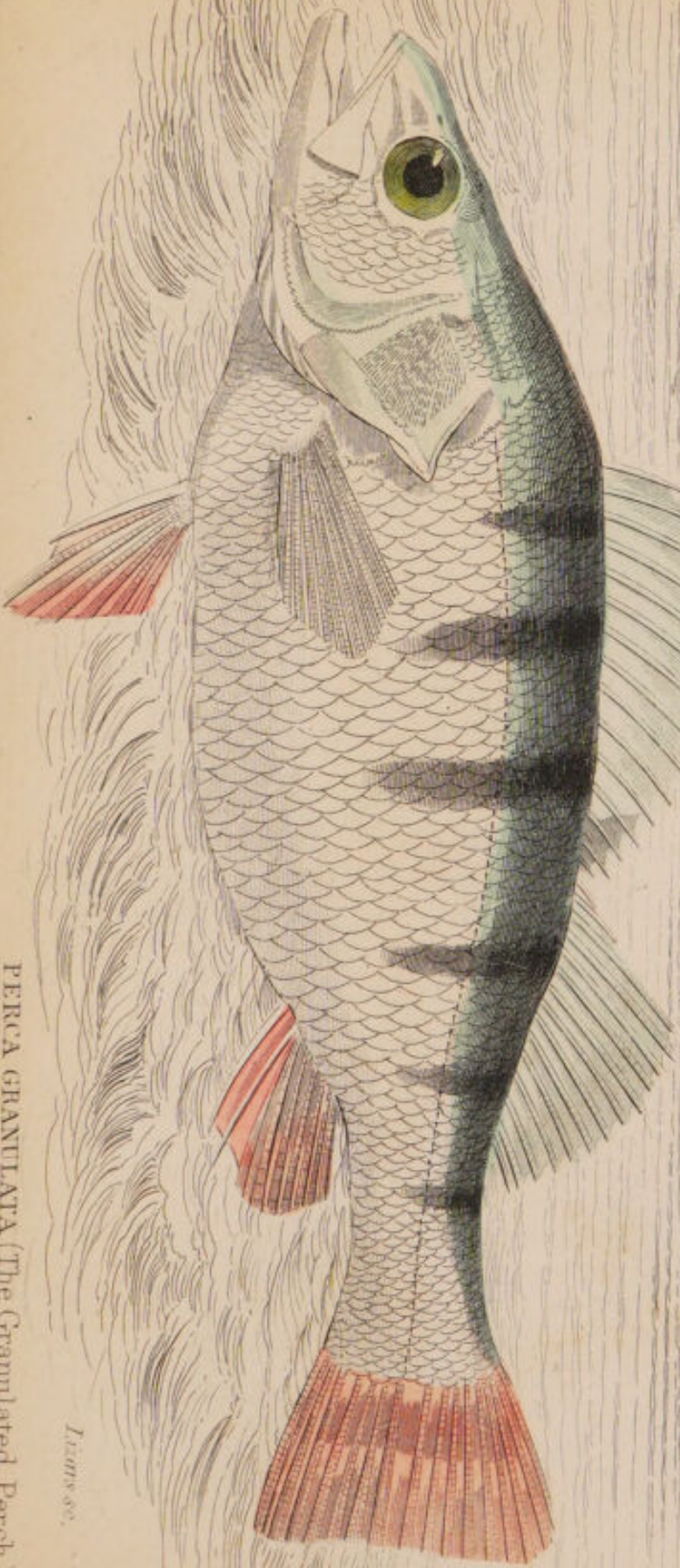
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PERCA GRANULATA (The Granulated Perch)  
(Falls of Niagara)

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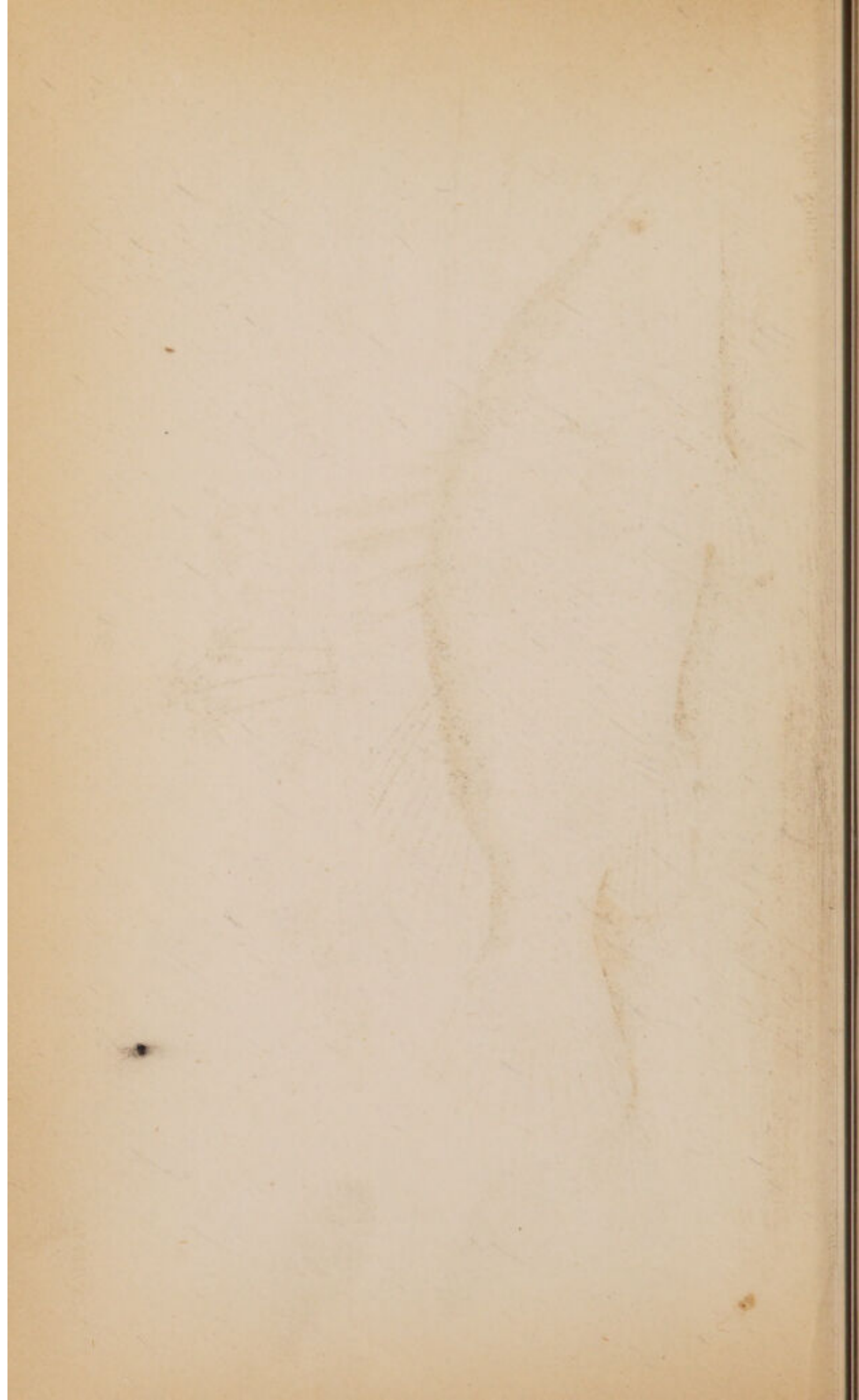




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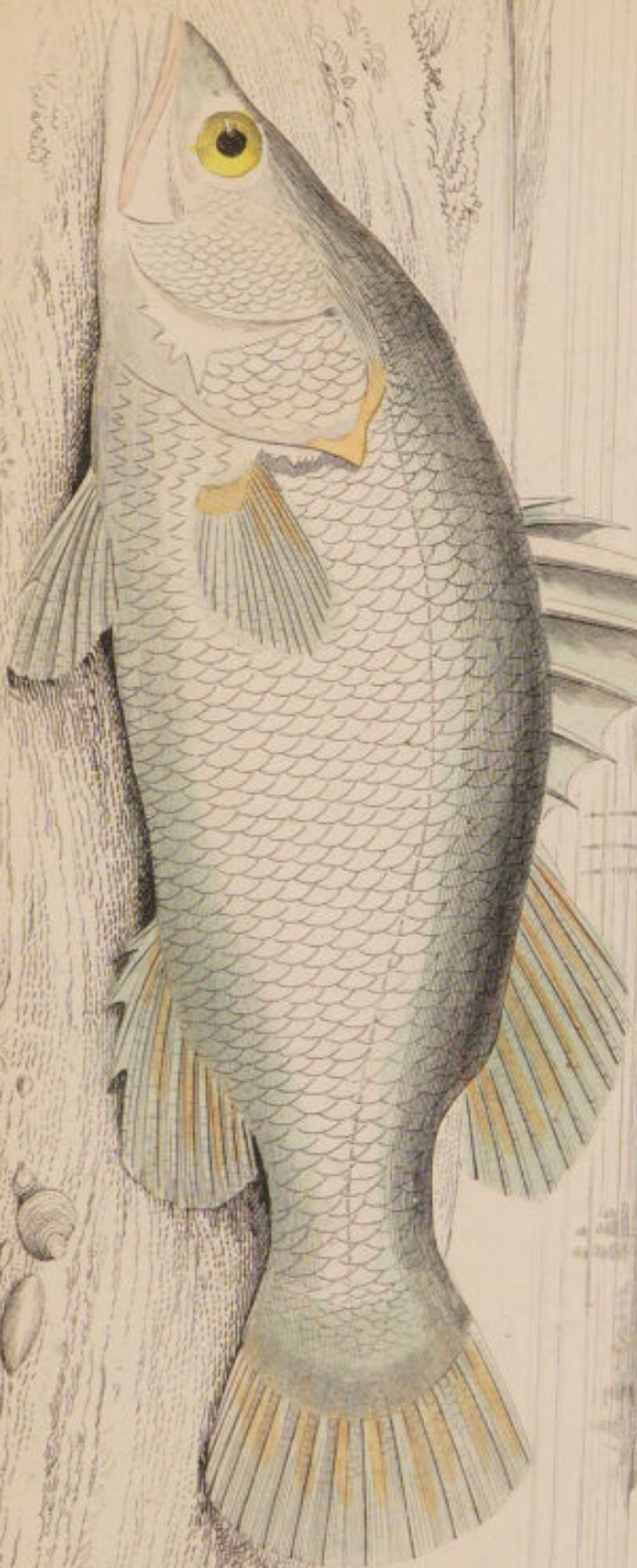
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LATES NOBILIS

(The Lates of the Nile)

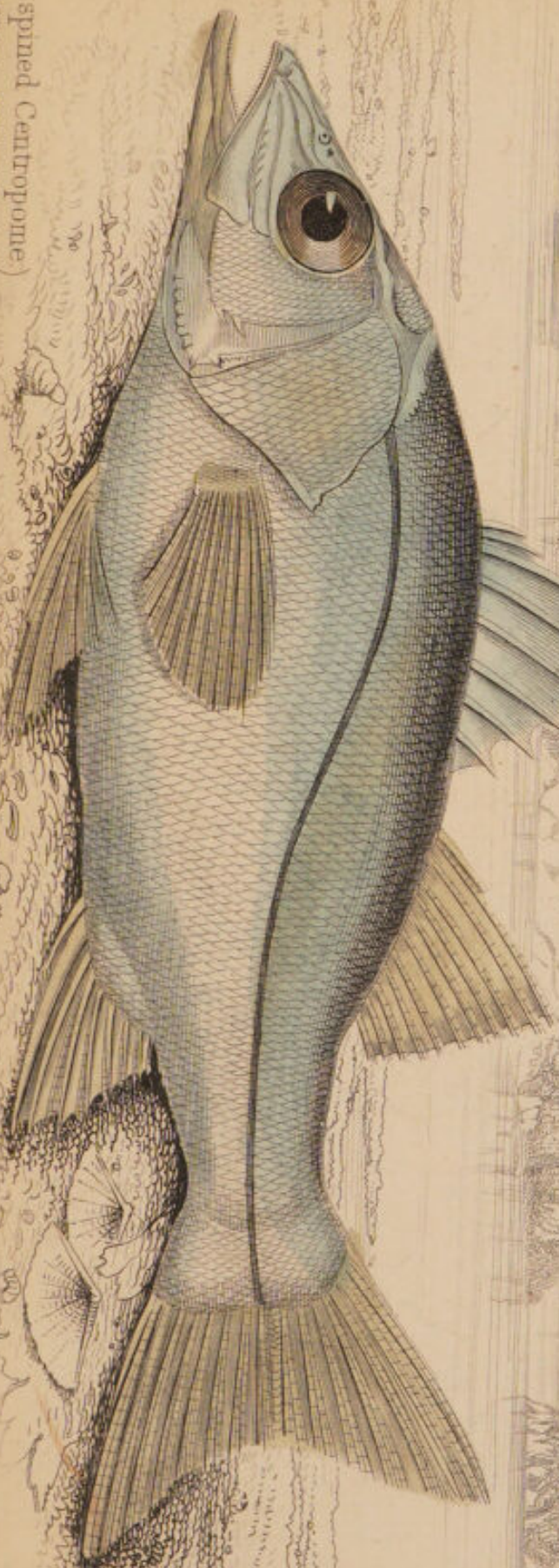






(Eleven-spined Centropome)  
CENTROPOMUS UNDECIMALIS

(Now near the Aboretus)

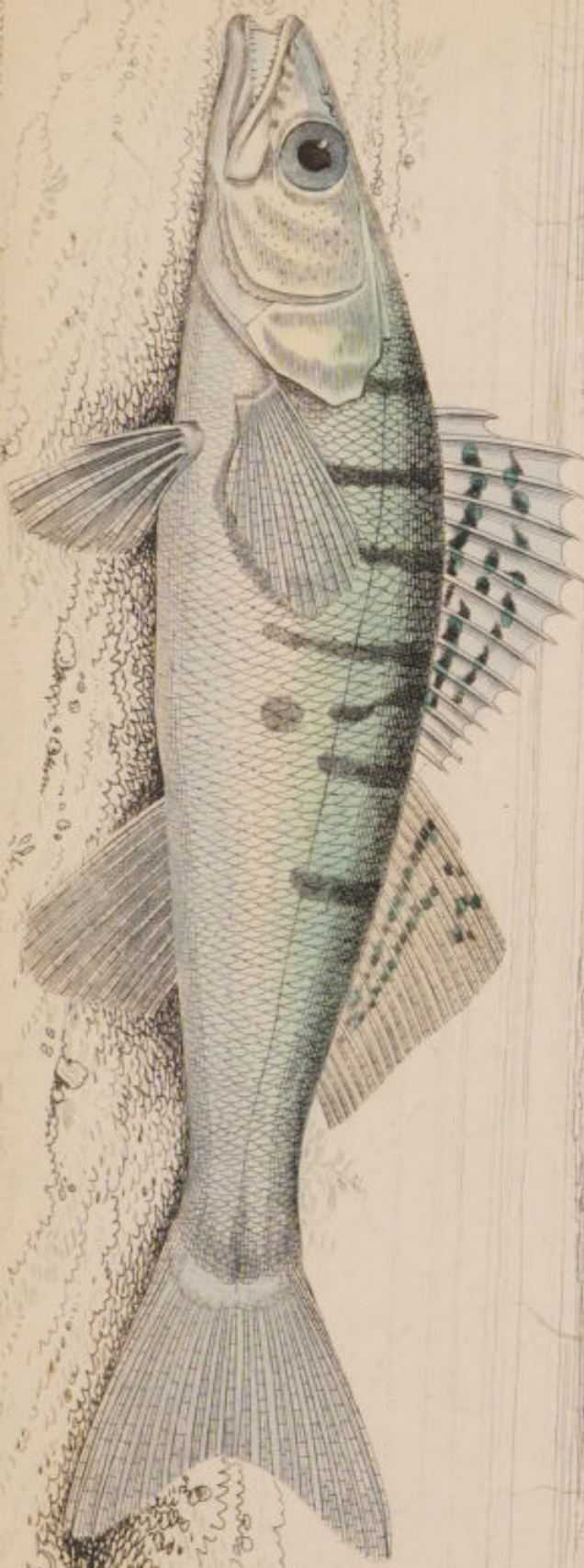


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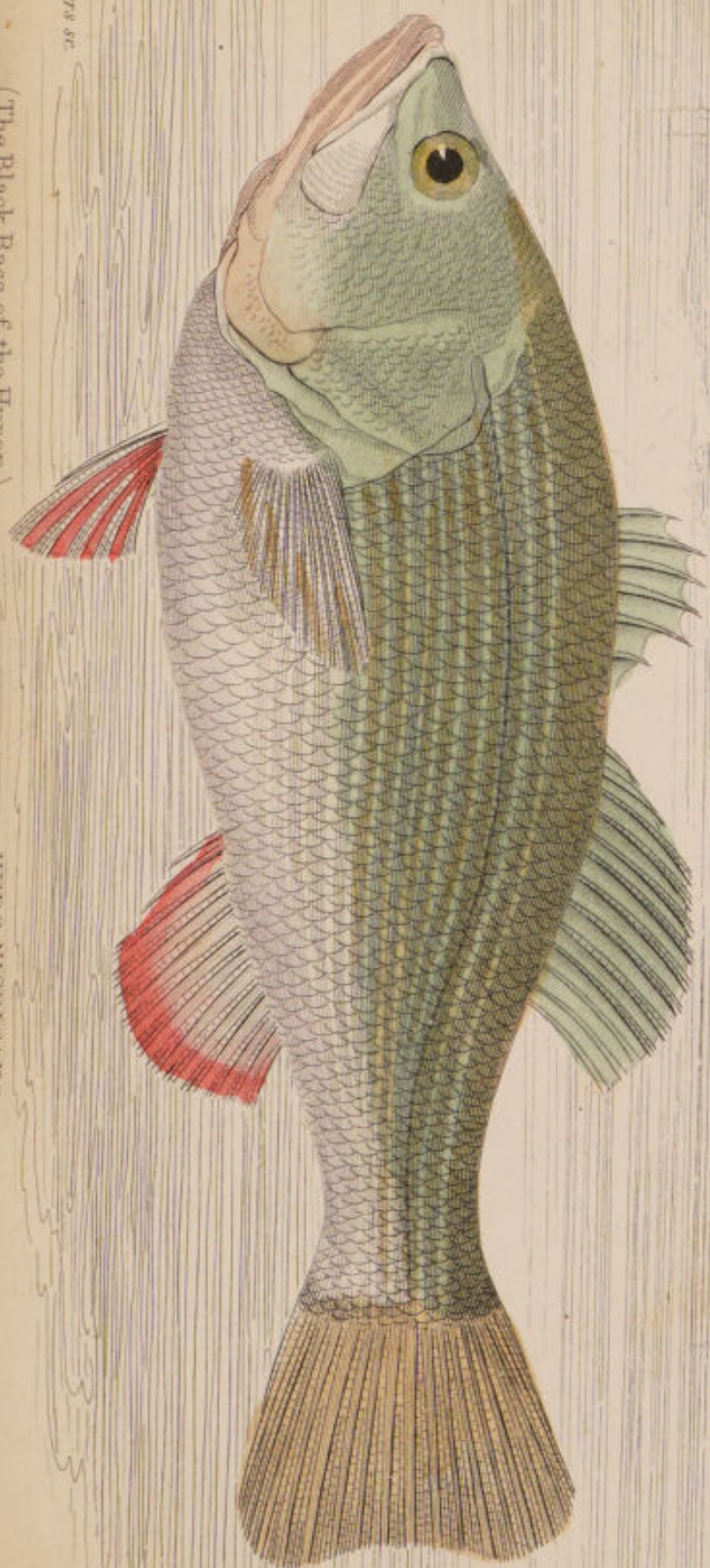
LUCIOPERCA SANDRA (The Common Pike Perch)  
(Falls of Montmorency)





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*Lepomis microlophus*

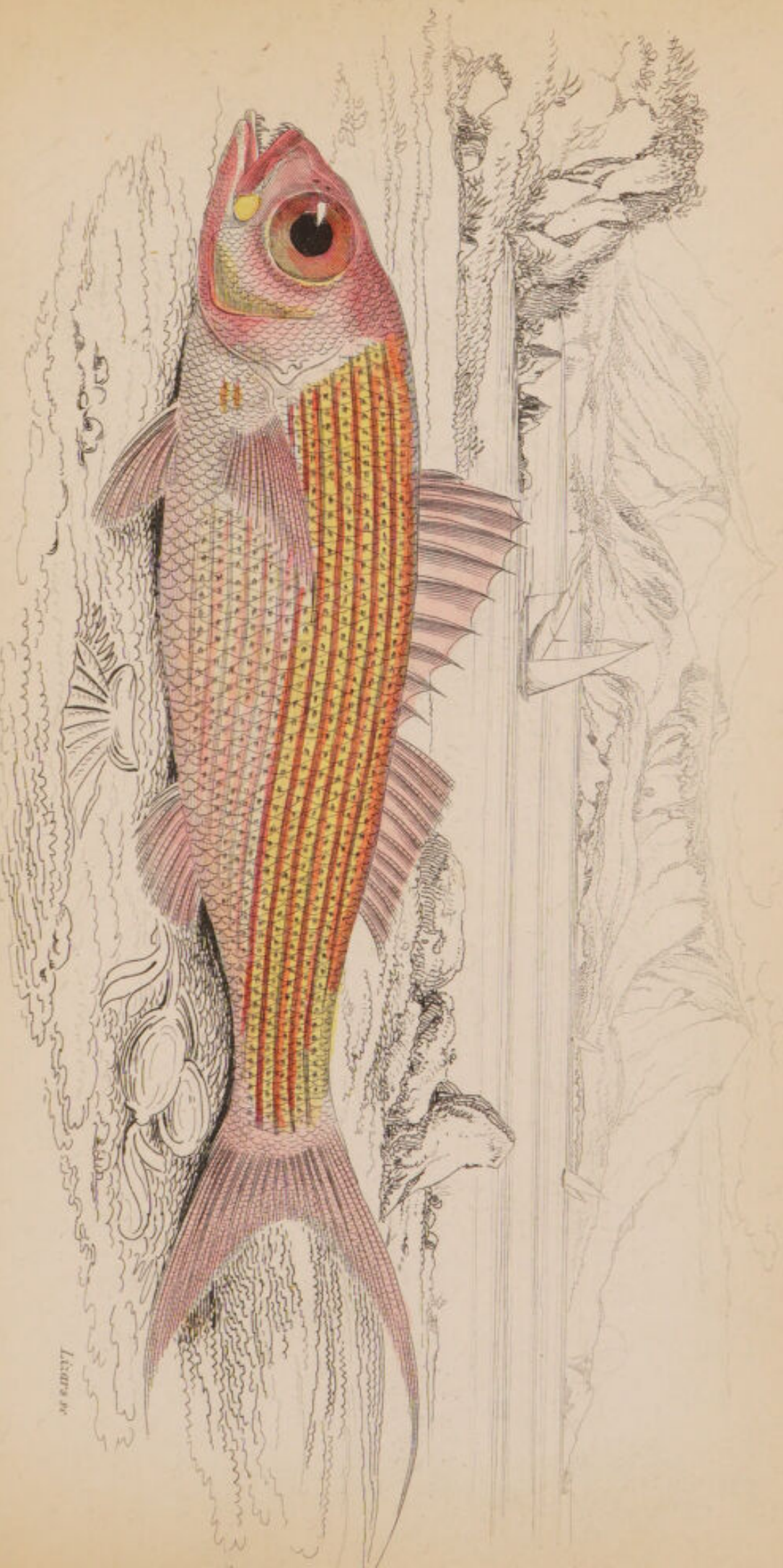
(The Black Bass of the Huron.)

HURO NIGRICANS



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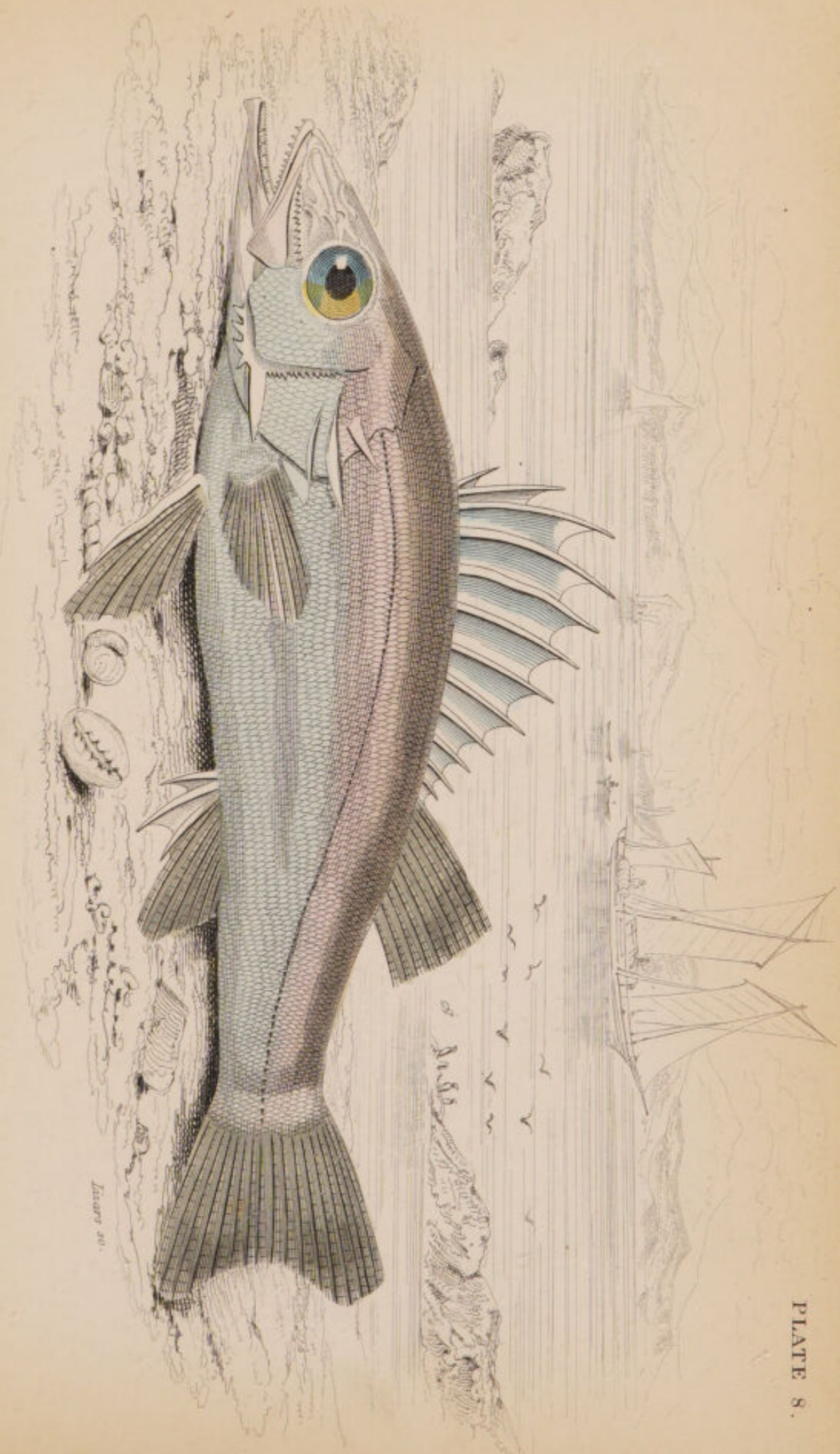
ETELIS CARBUNCULUS (The Ruby-coloured Etelis).  
(Island of Yubutoo).



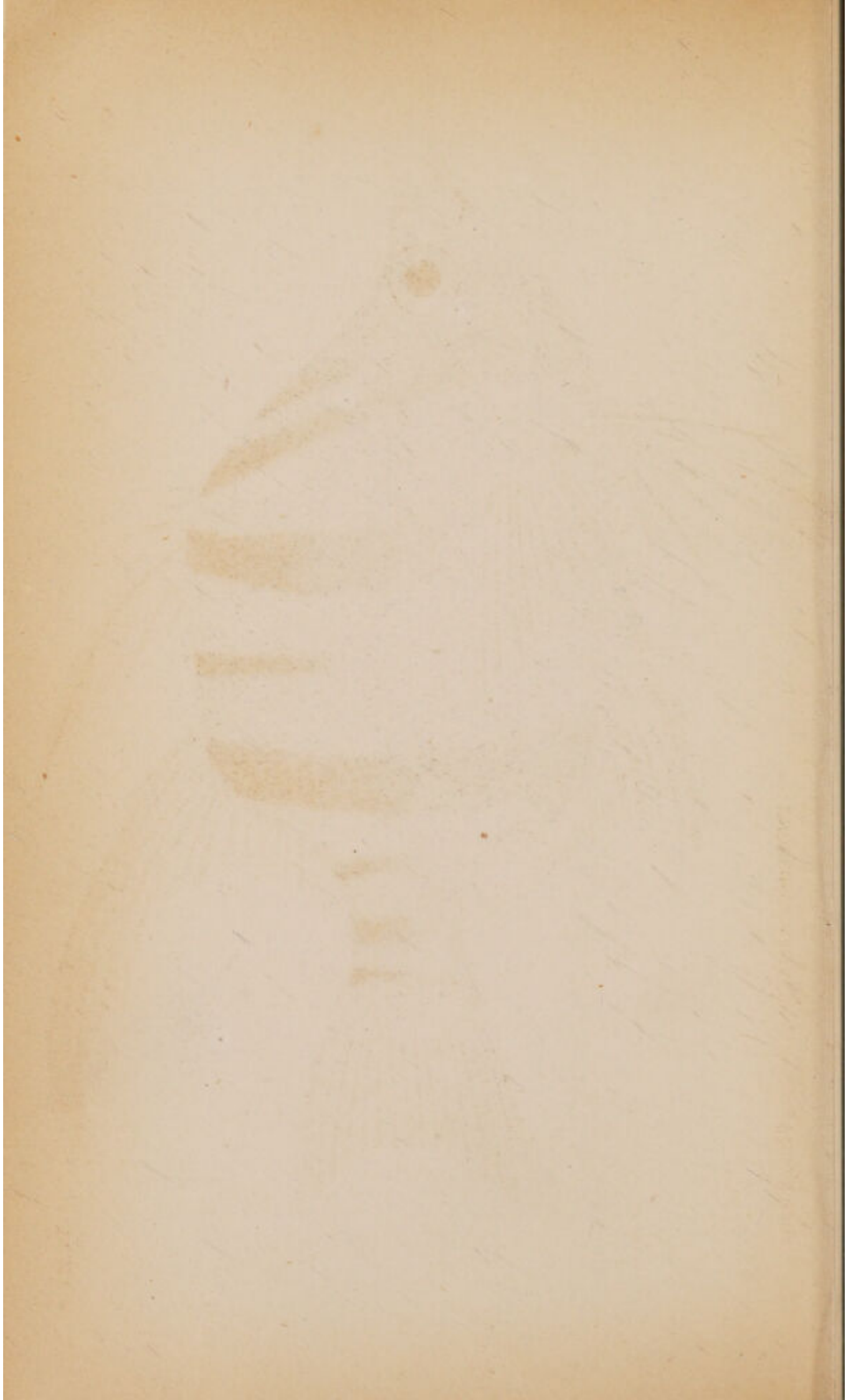


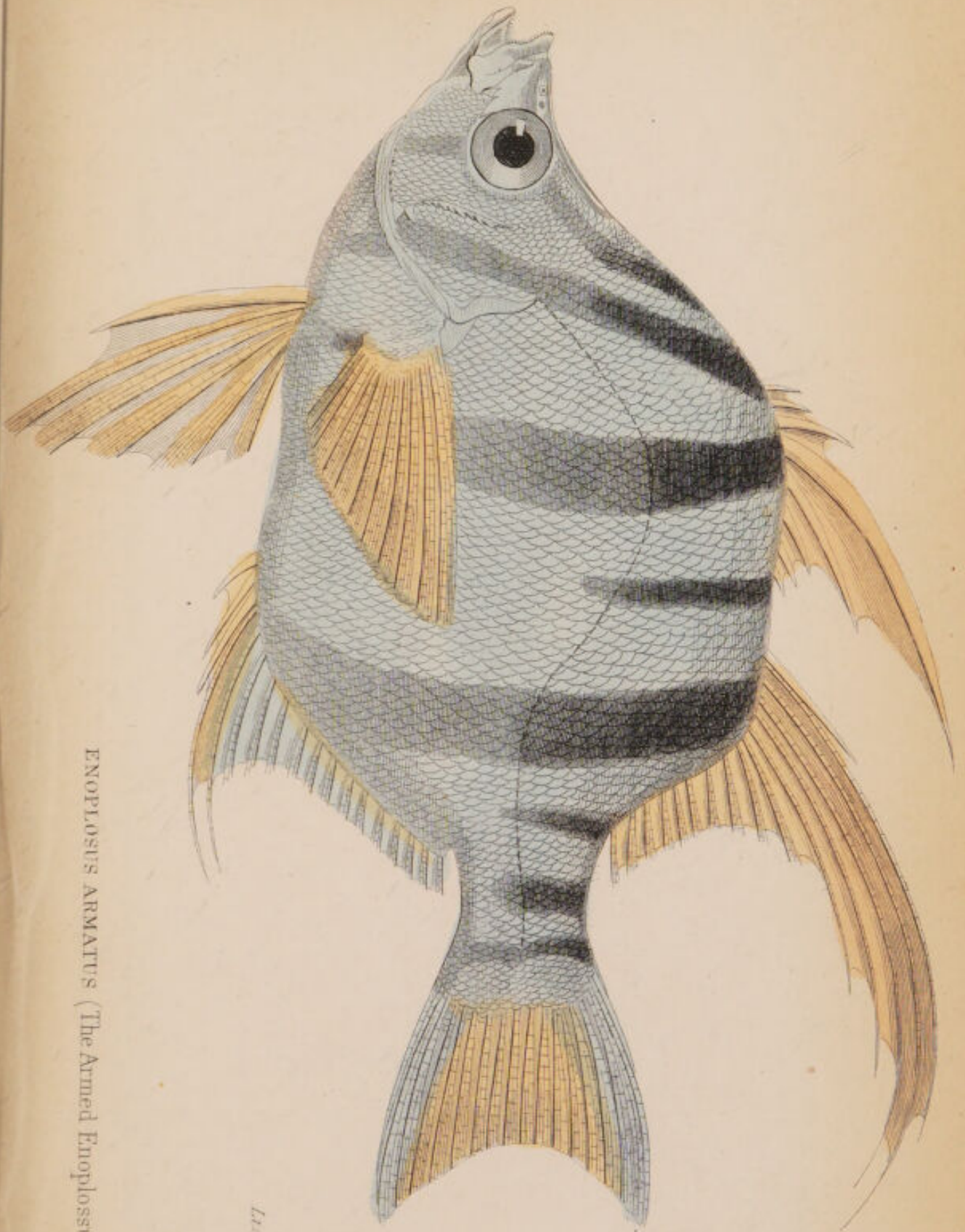


(The Spined Nippon.)  
NIPHON SPINOSTIS





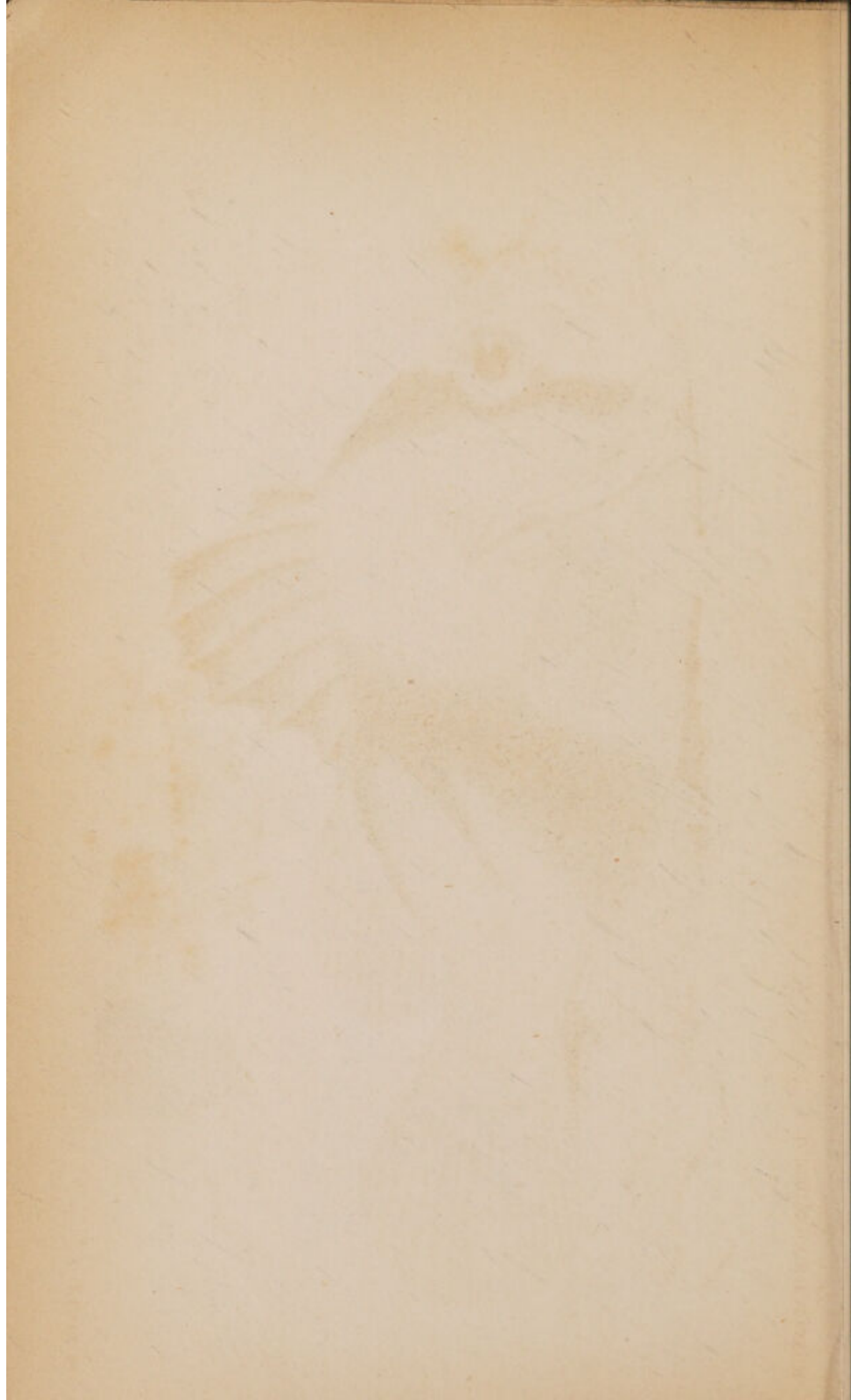


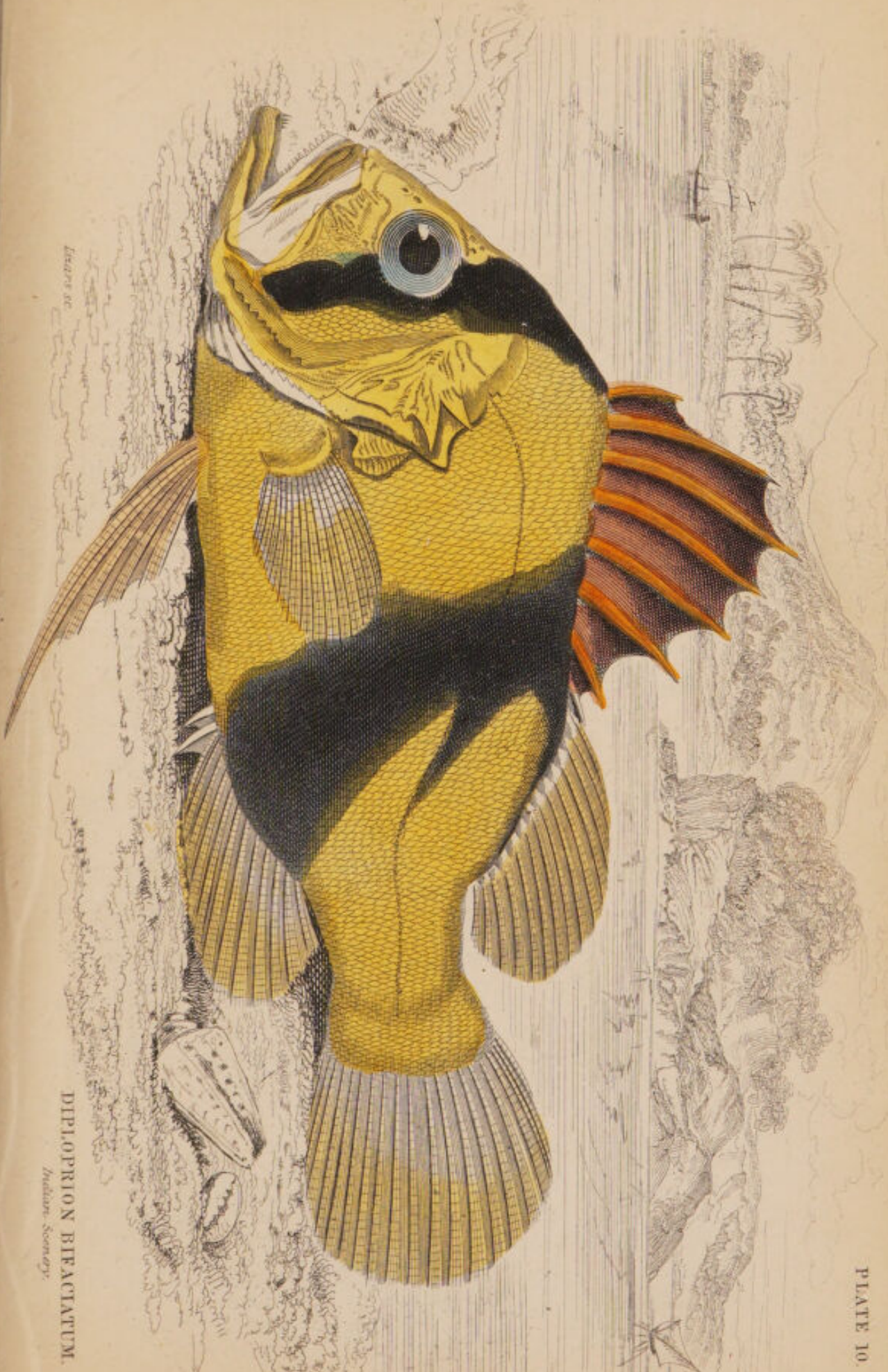


ENOPILOSUS ARMATUS (The Armed Enoplossus.)

*La. 1853.*



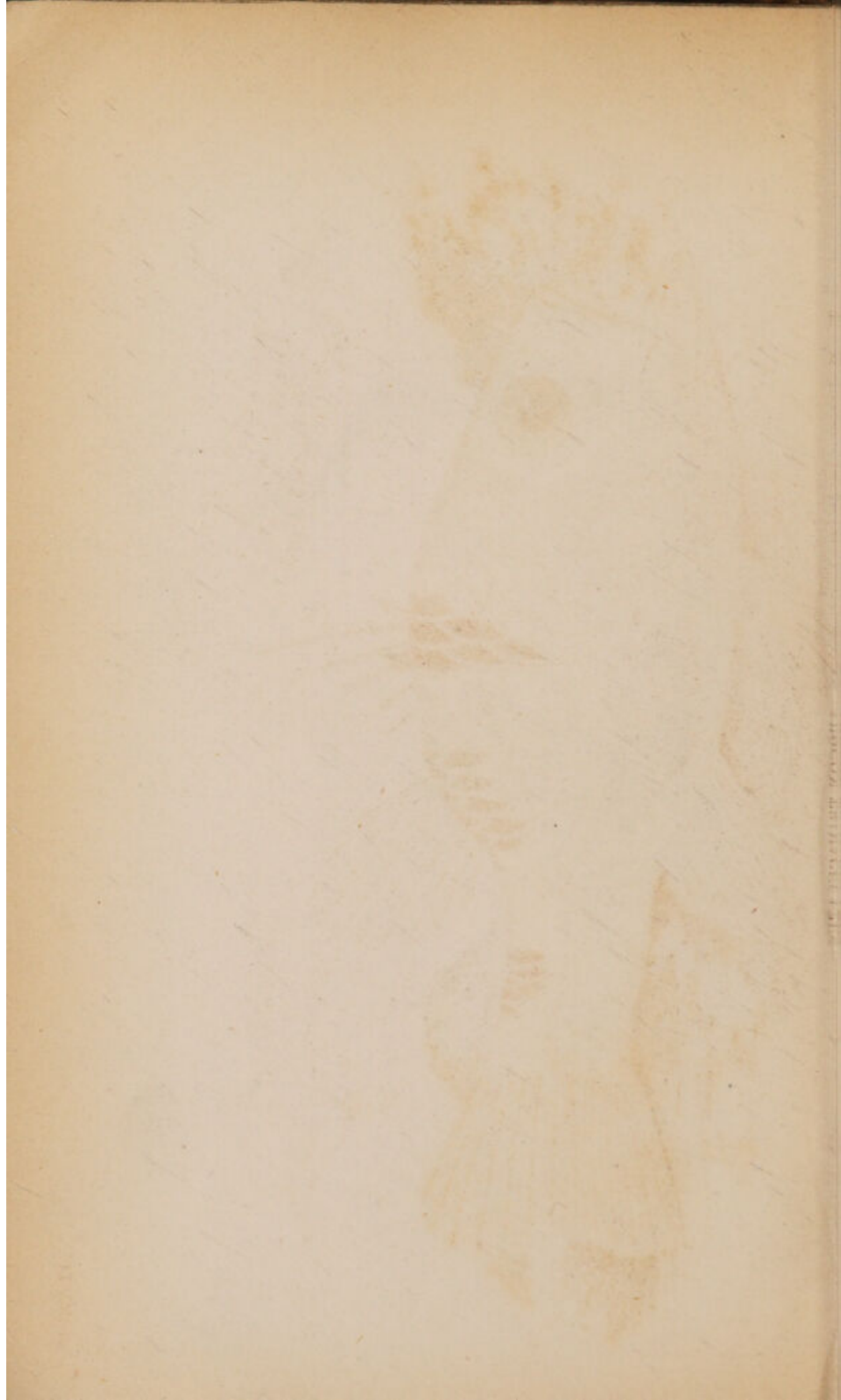




DIPTOPOMUS BIFASCIATUS.

*Indian Ocean.*

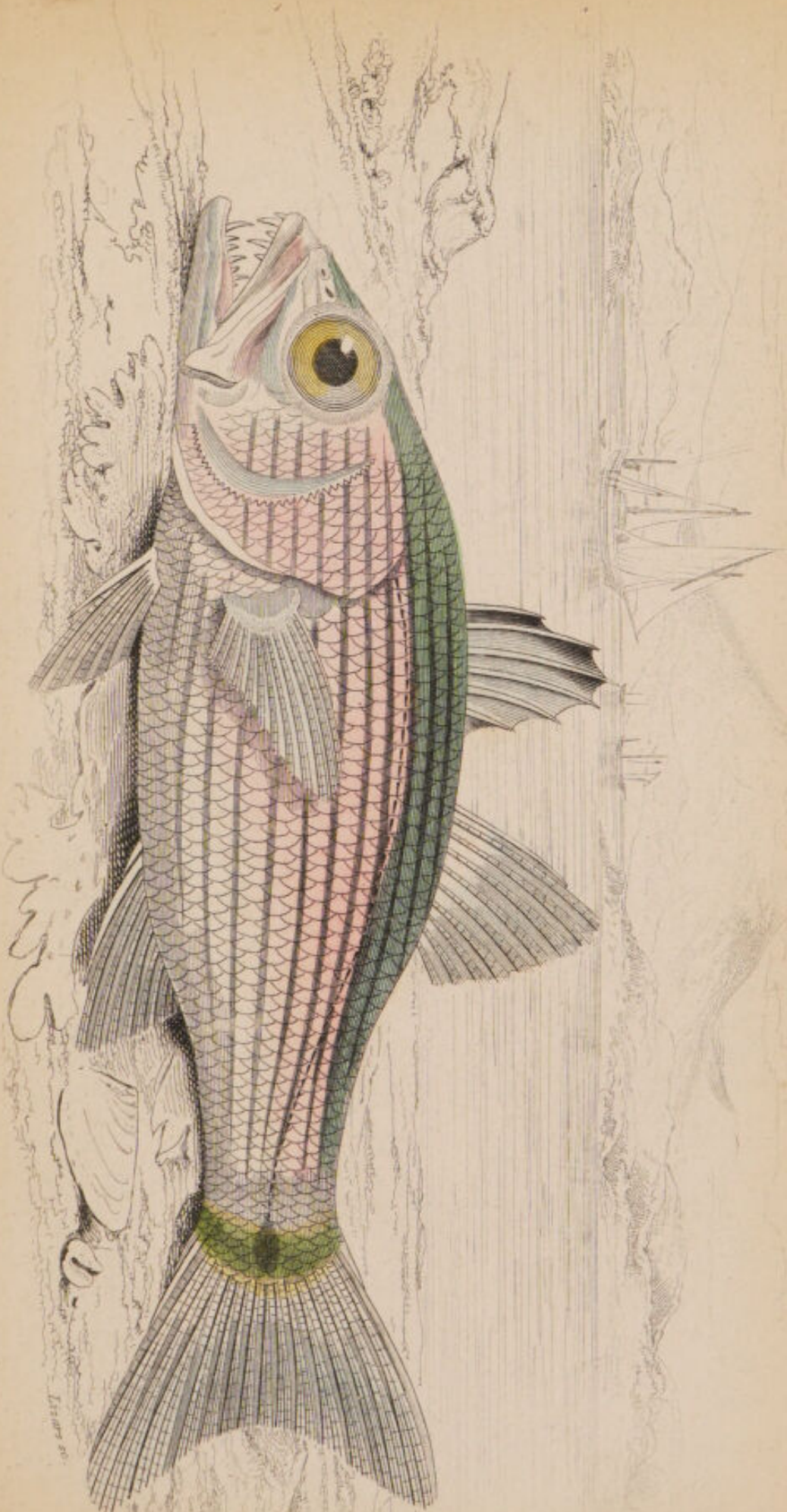




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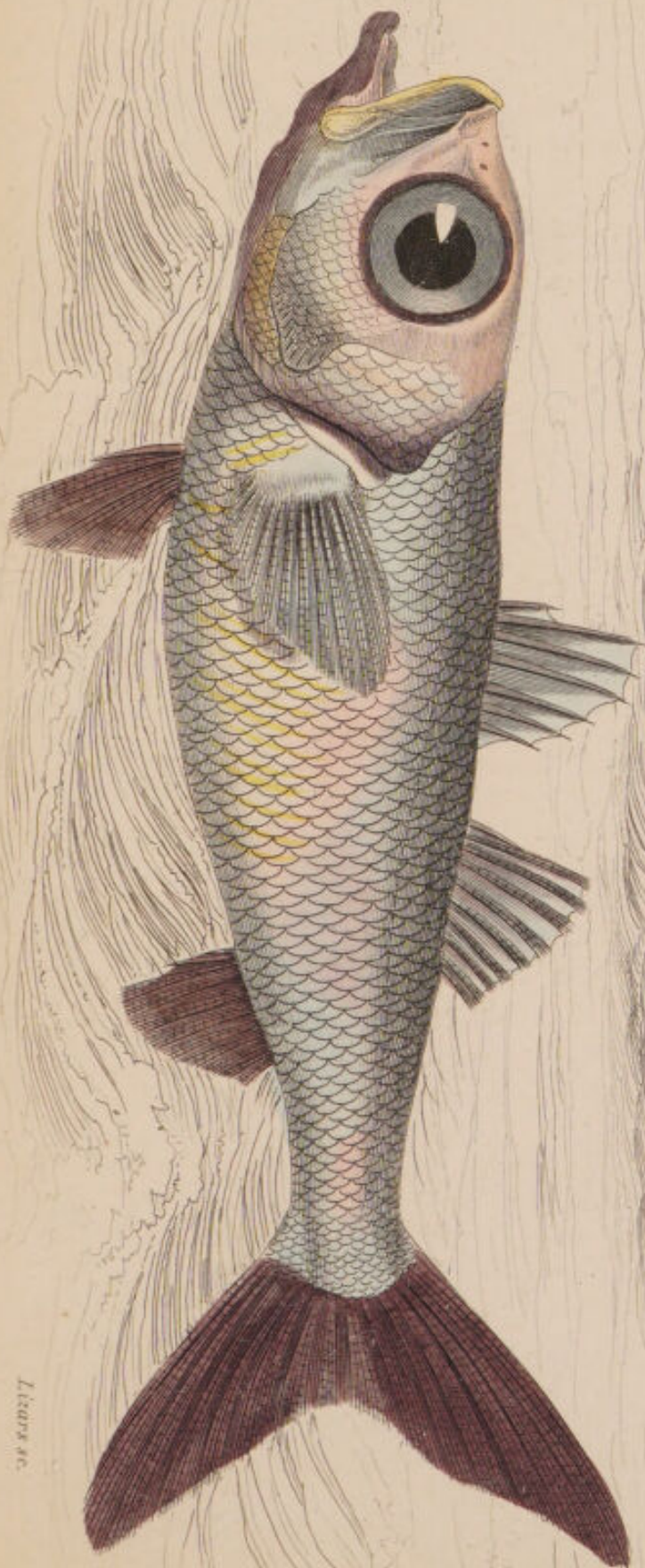




CHEILODIPTERUS ARABICUS (Arabian Cheilodipterus.)





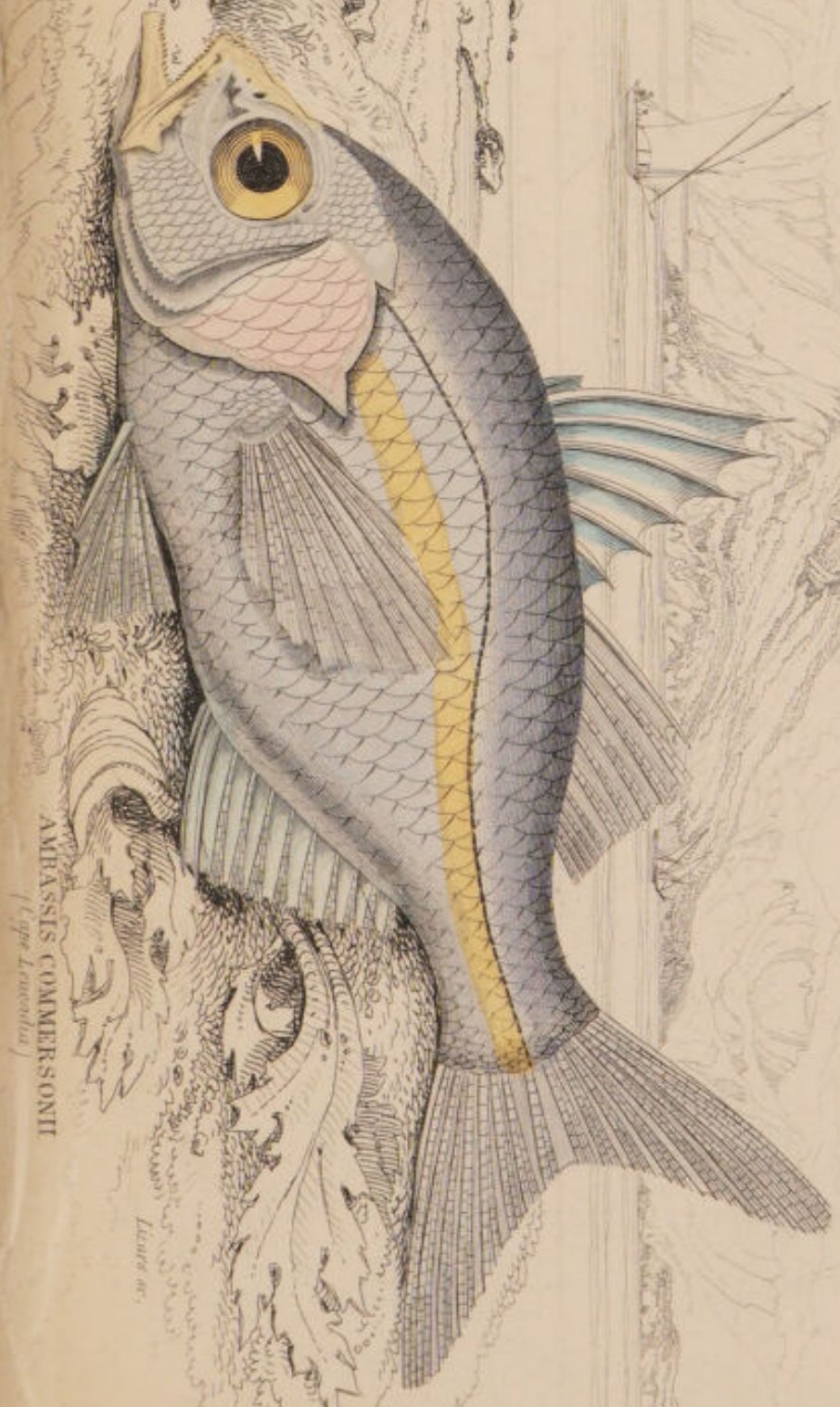


POMATOMUS TELESCOPIUM  
(Striped Bass)

*Lisans etc.*



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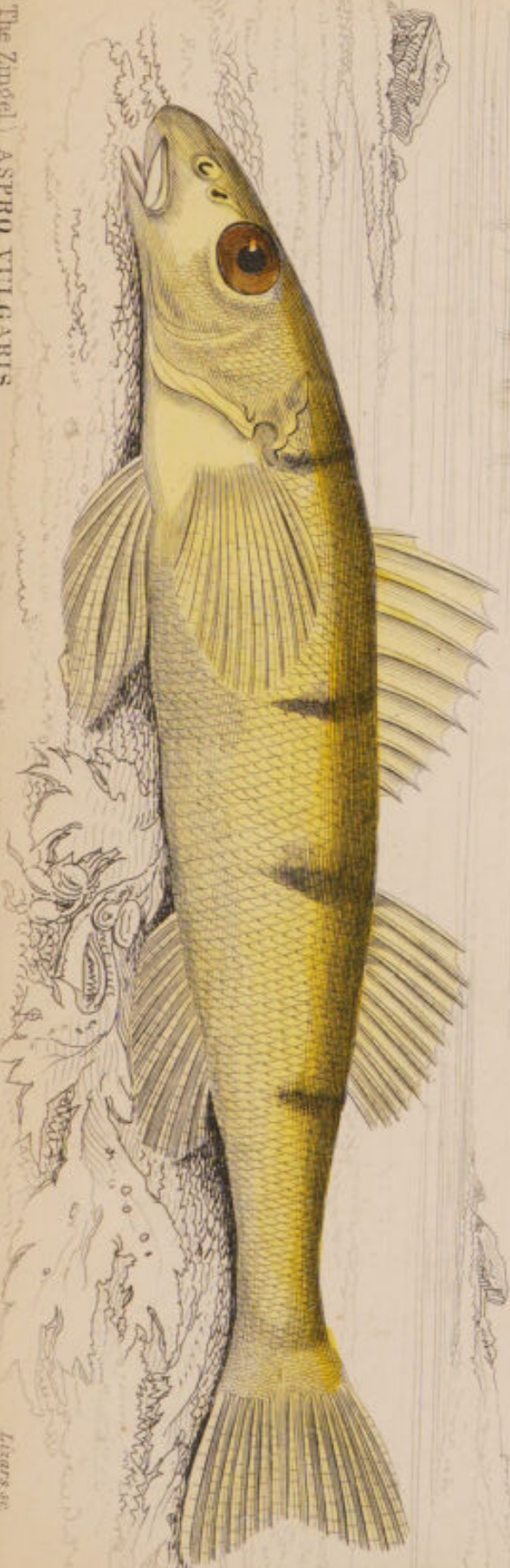
ABRASSUS COMMERSONI  
(type Linnæus)



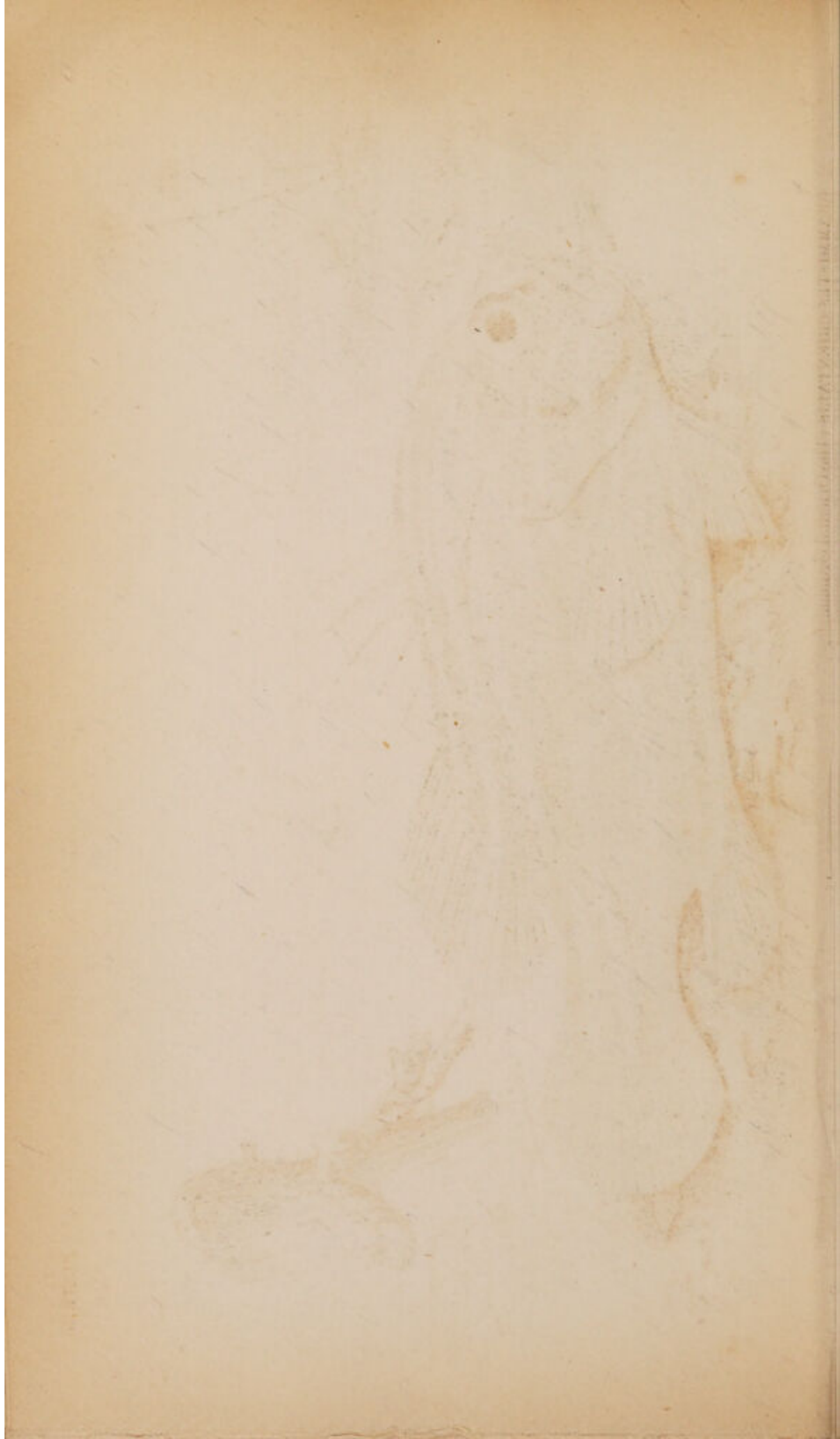
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(The Zingel) ASPRO VULGARIS  
(View on the Rhone)

Lizars. sc.





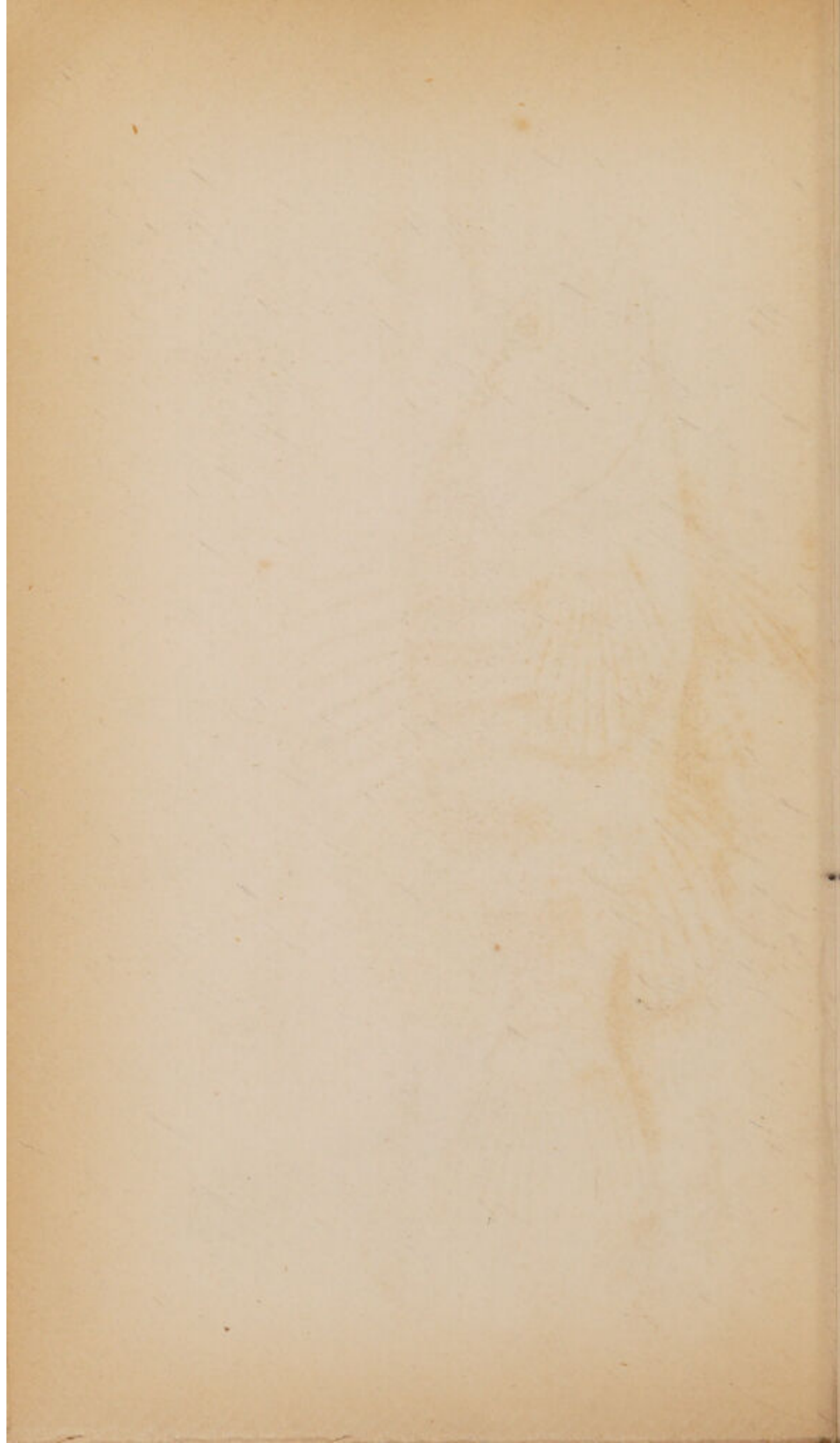


GRAMMISTES ORIENTALIS (The Oriental Grammistes)  
(Molbois)

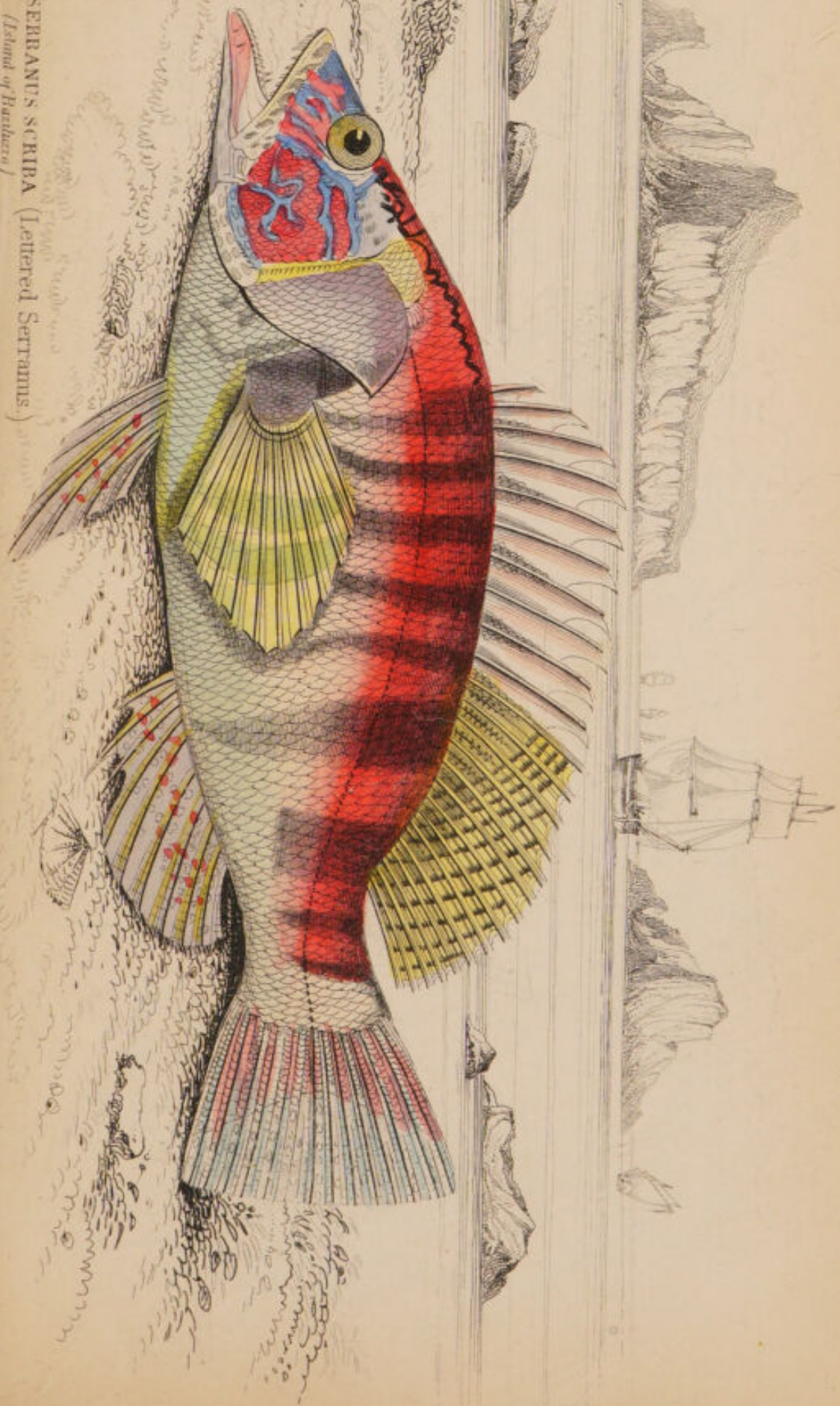
Leach & Co.



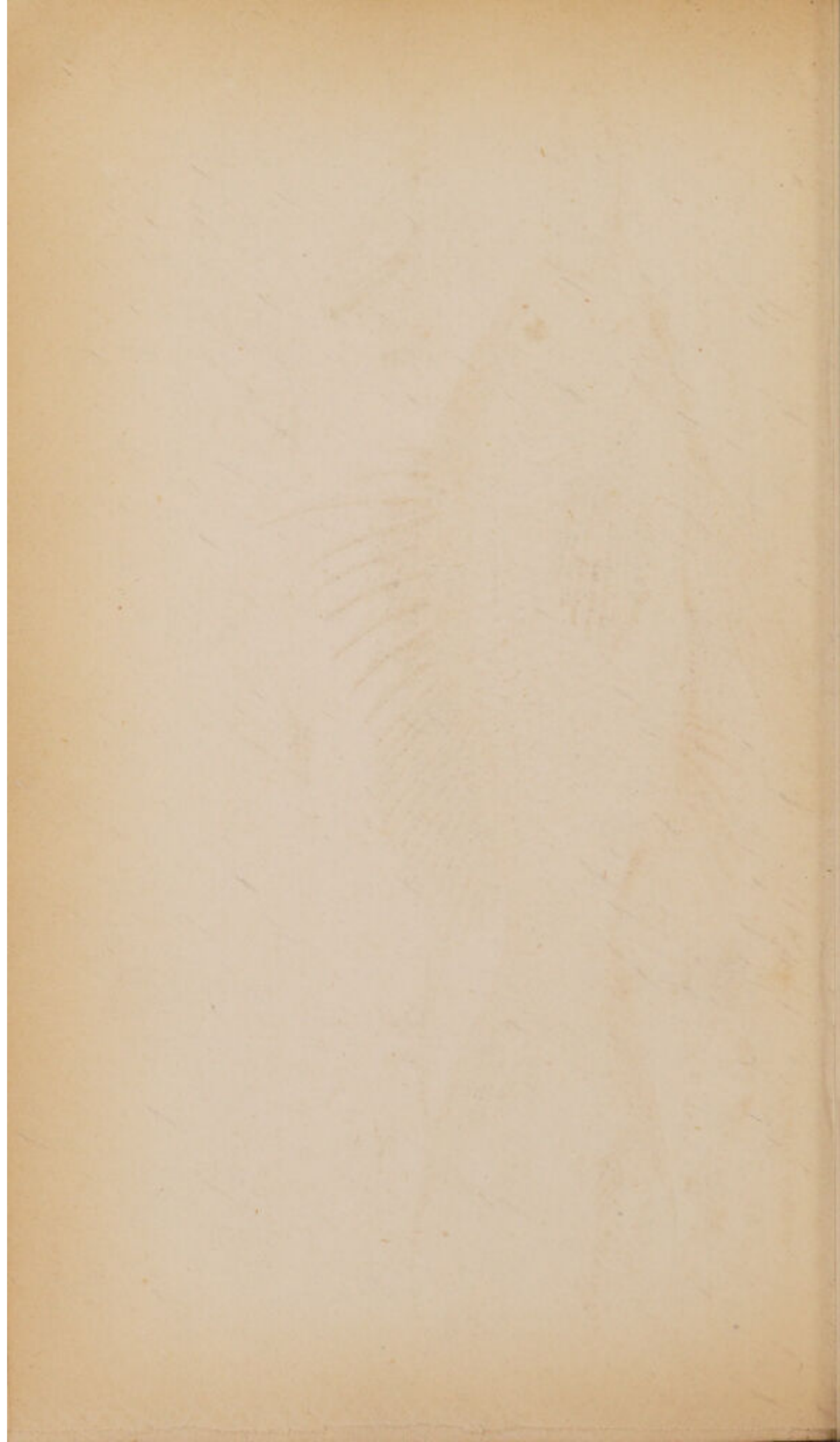


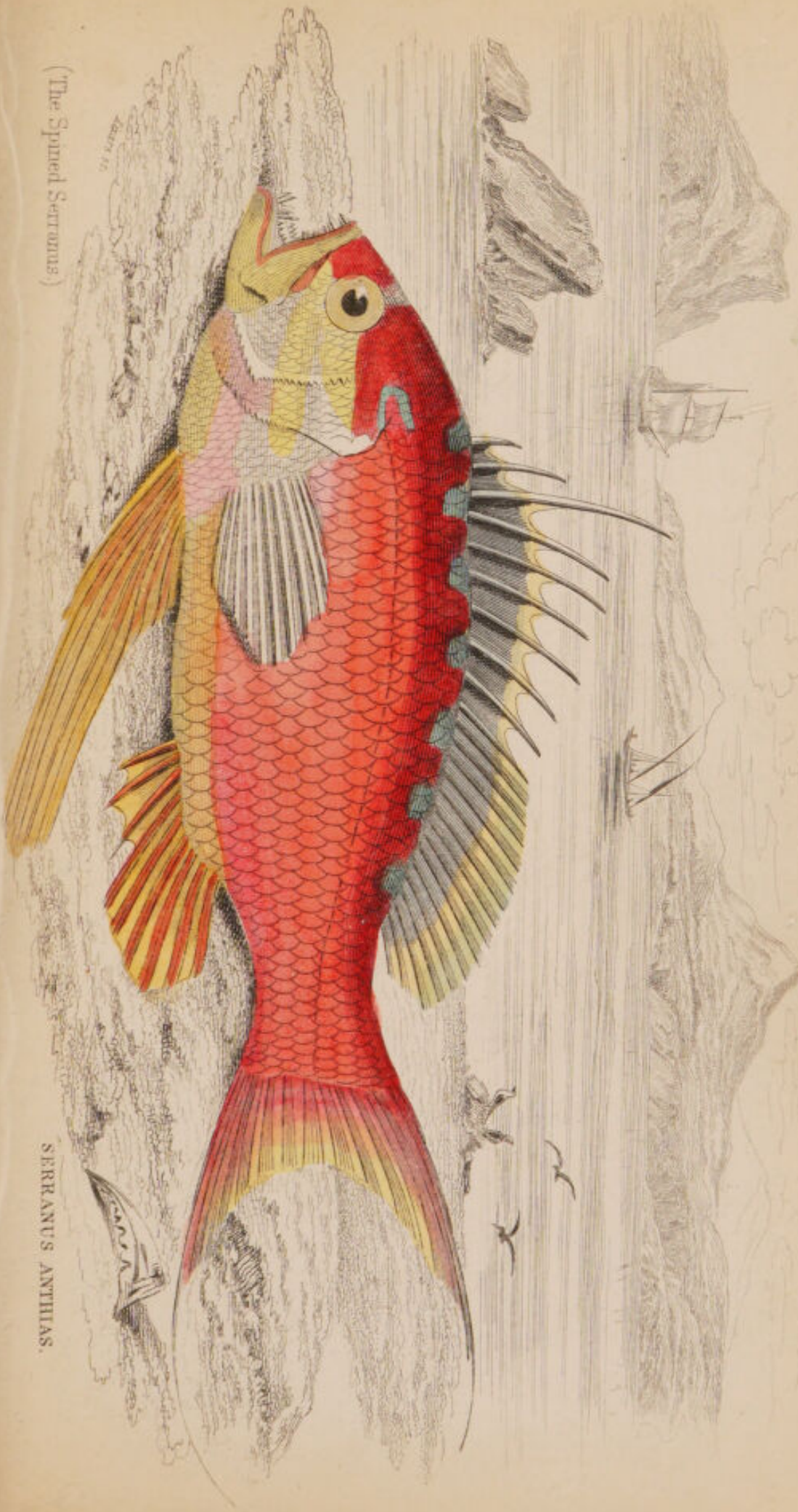


SEHRANUS SCRIBA (lettered Settrains)  
(Island of Barbado)





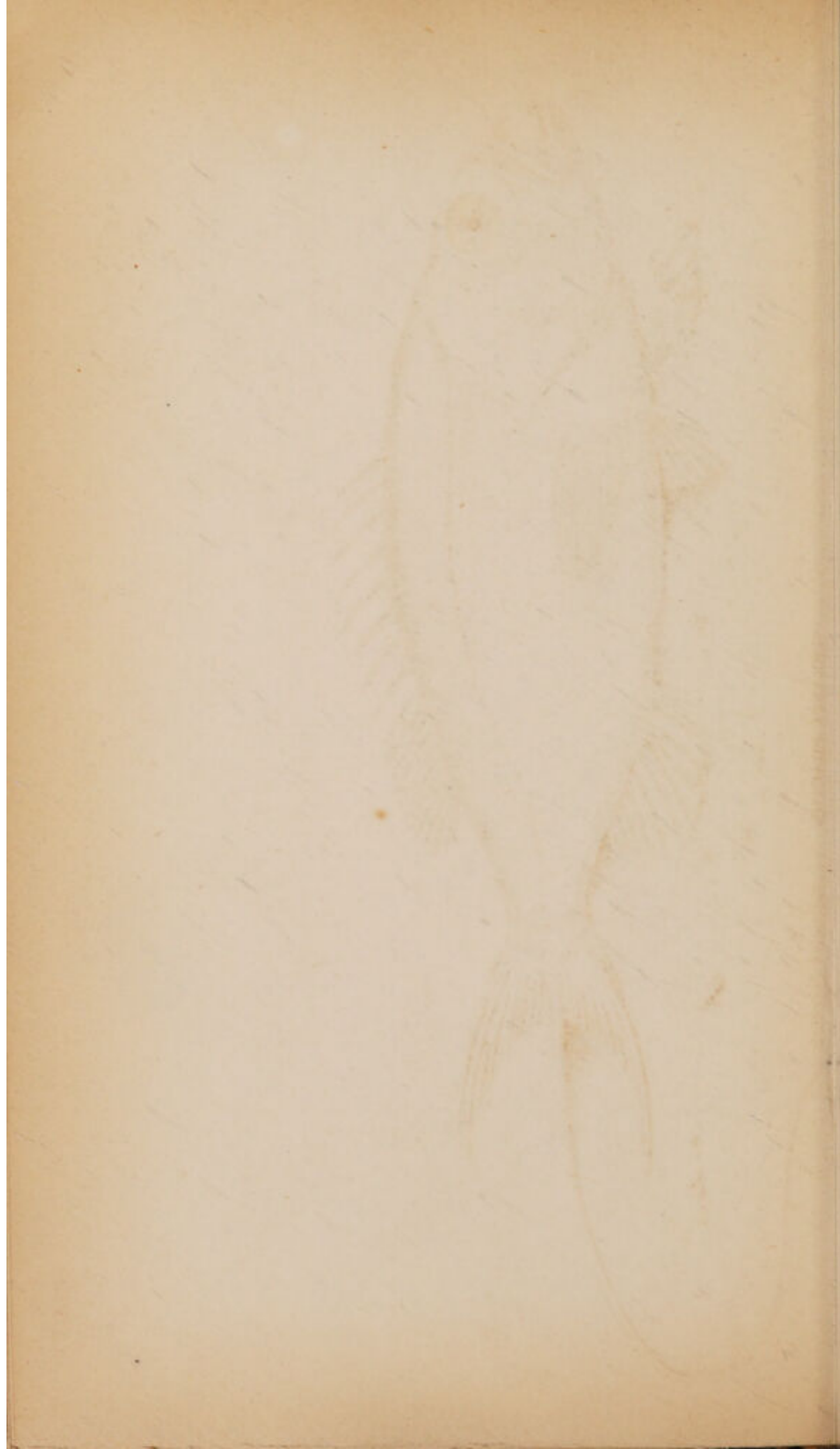




(The Spined Serranus)

SERRANUS ANTHIAS.





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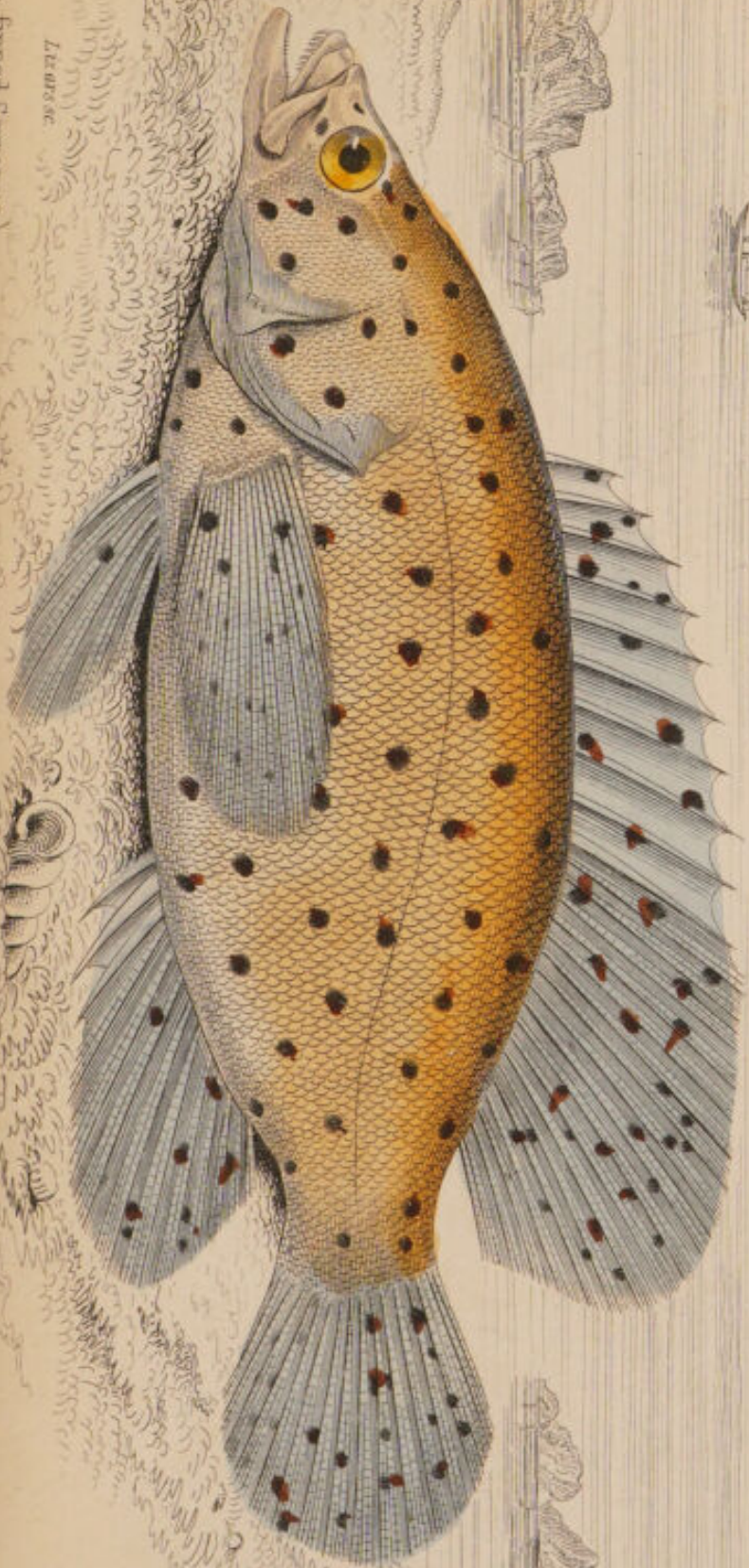




(Large-finned Serranus)

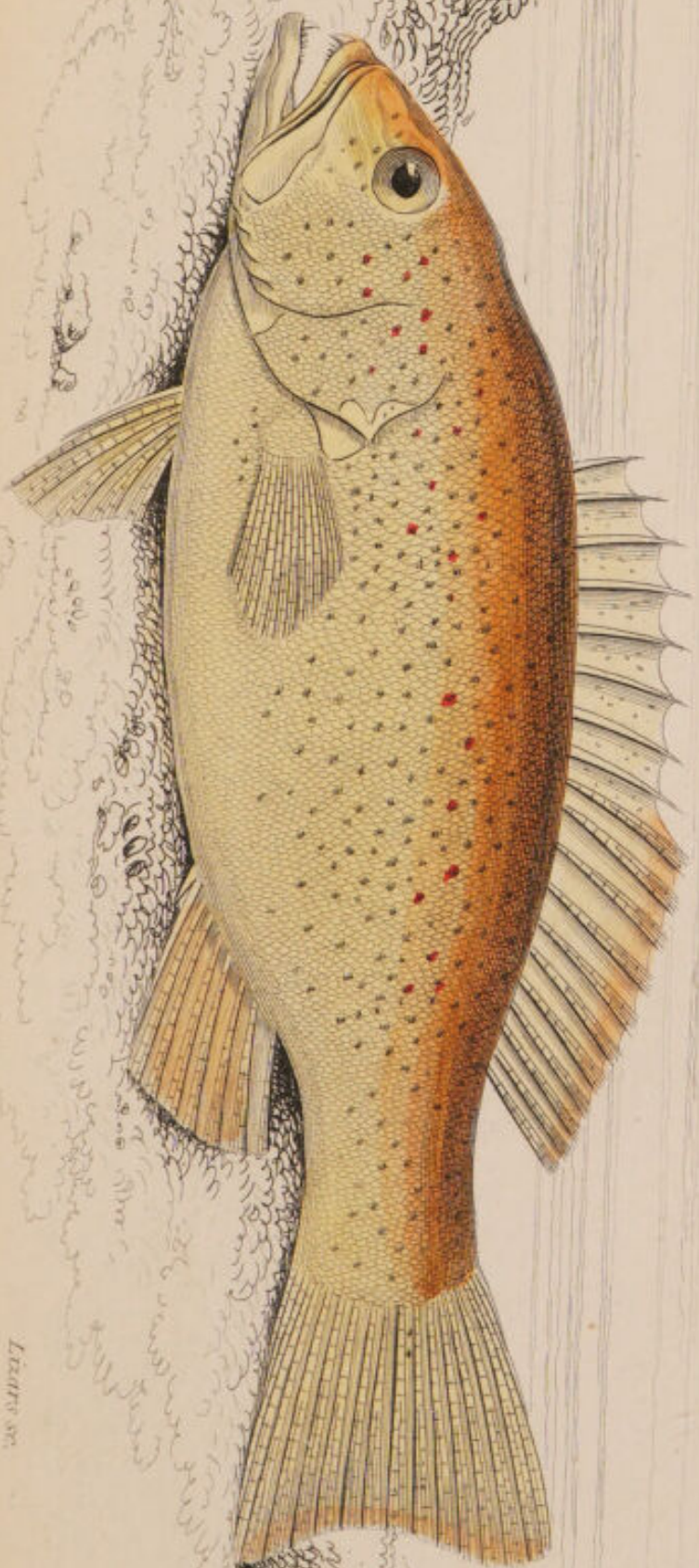
*Licorisc*

SERRANTS ACTIVELLIS









PLECTROPOMA LEOPARDINUS (Leopard-spotted Plectropoma)

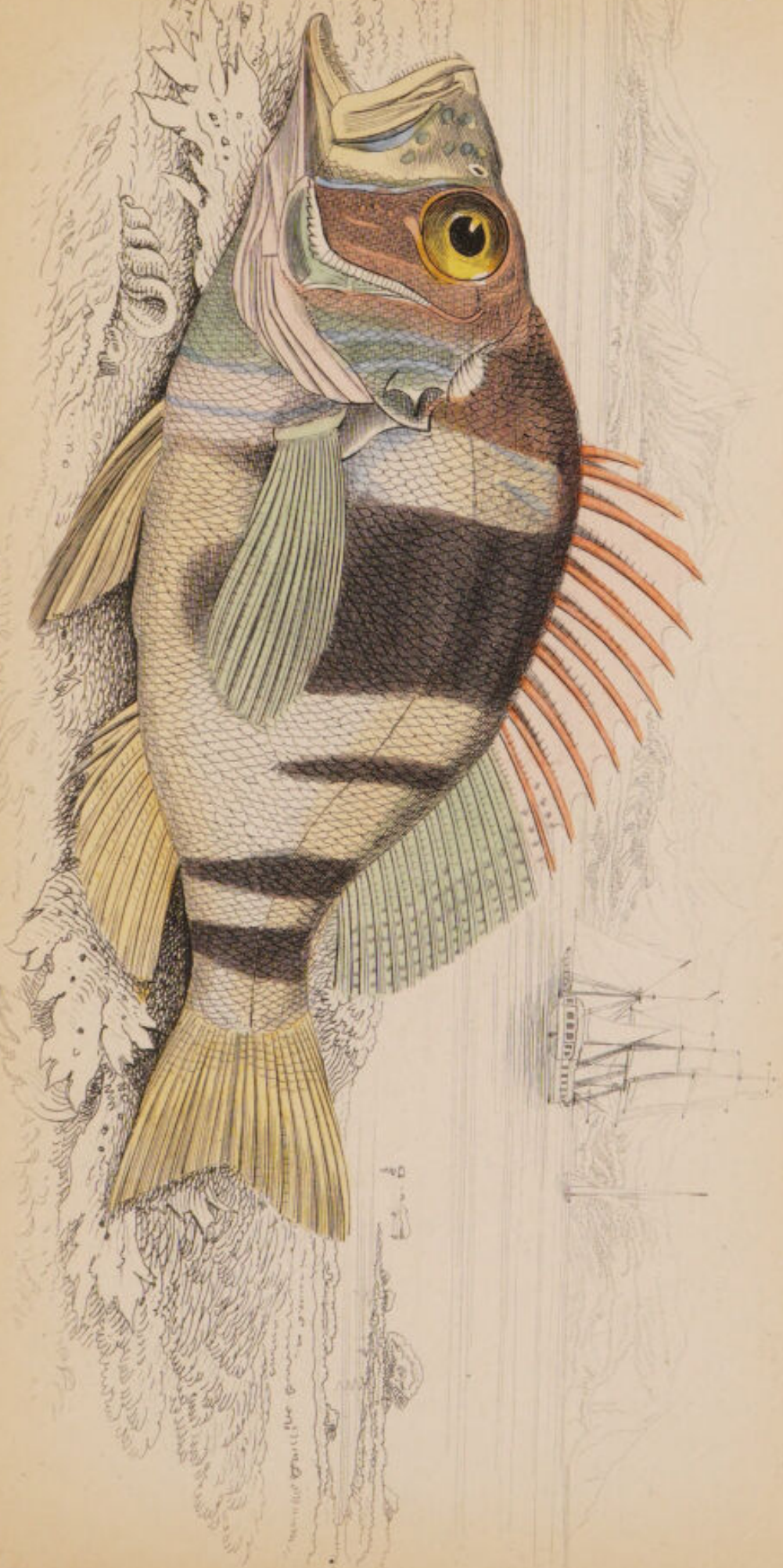
*L. J. G. 1850*



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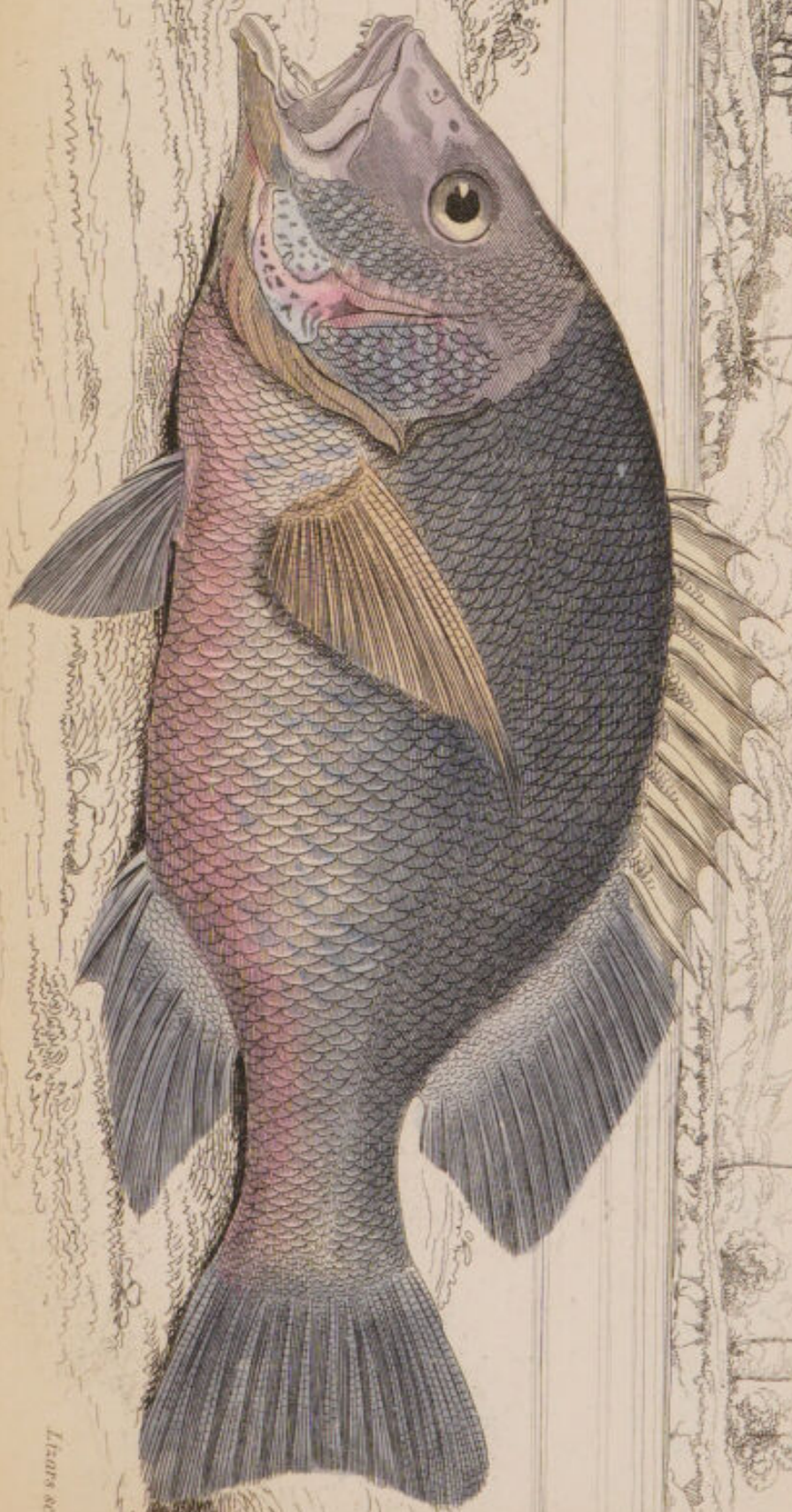
PLECTROPOMA PUELLA (Beautiful Plectropoma.)

*Liears sc.*









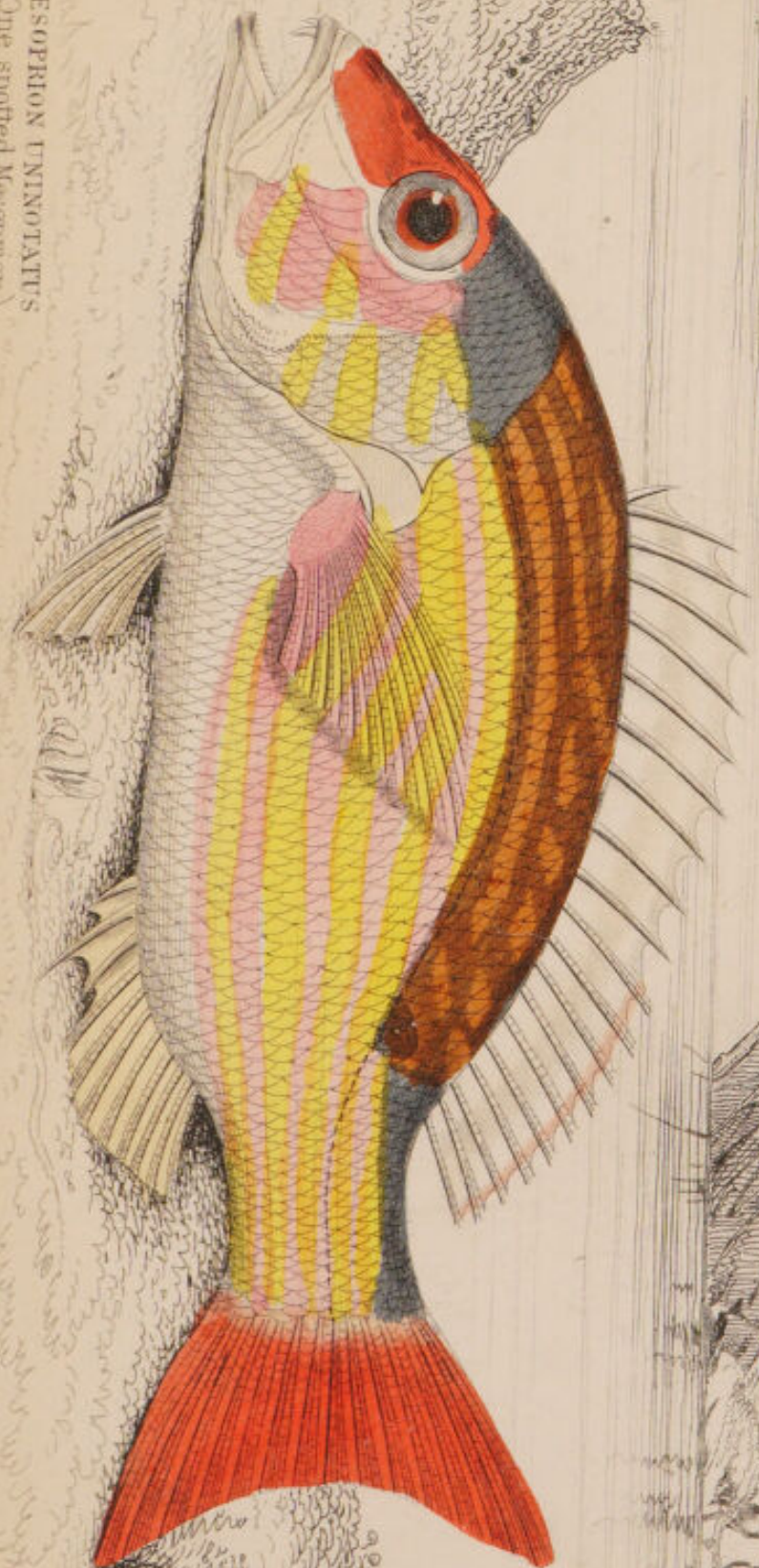
*DIACOPE RIVULATA* (Banded Diacope)

*L. 1880*



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MESOPRION UNINOTATUS  
(One spotted Mesoprion)



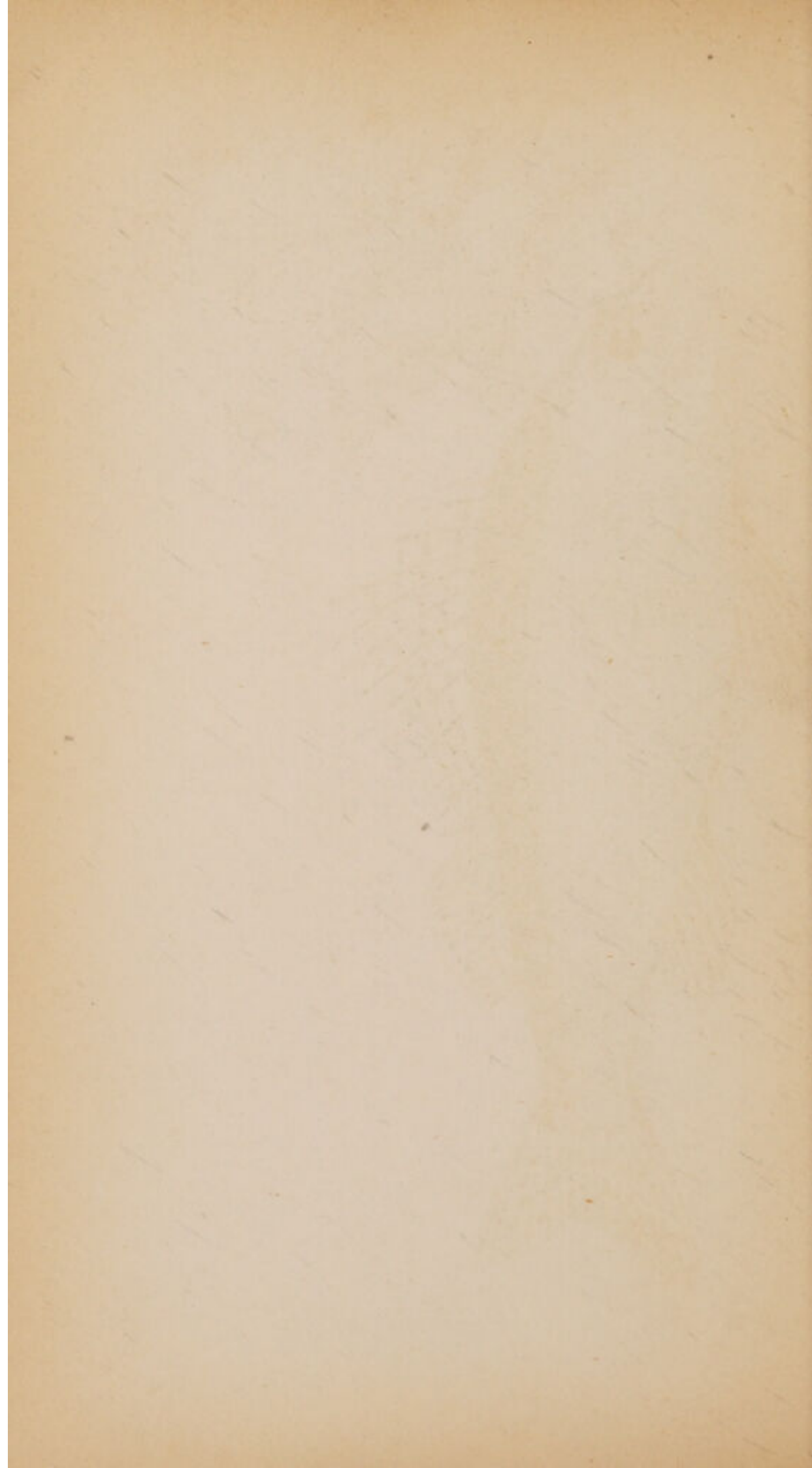




MESOPRION CHRYSURUS (Golden-tailed Mesoprion)

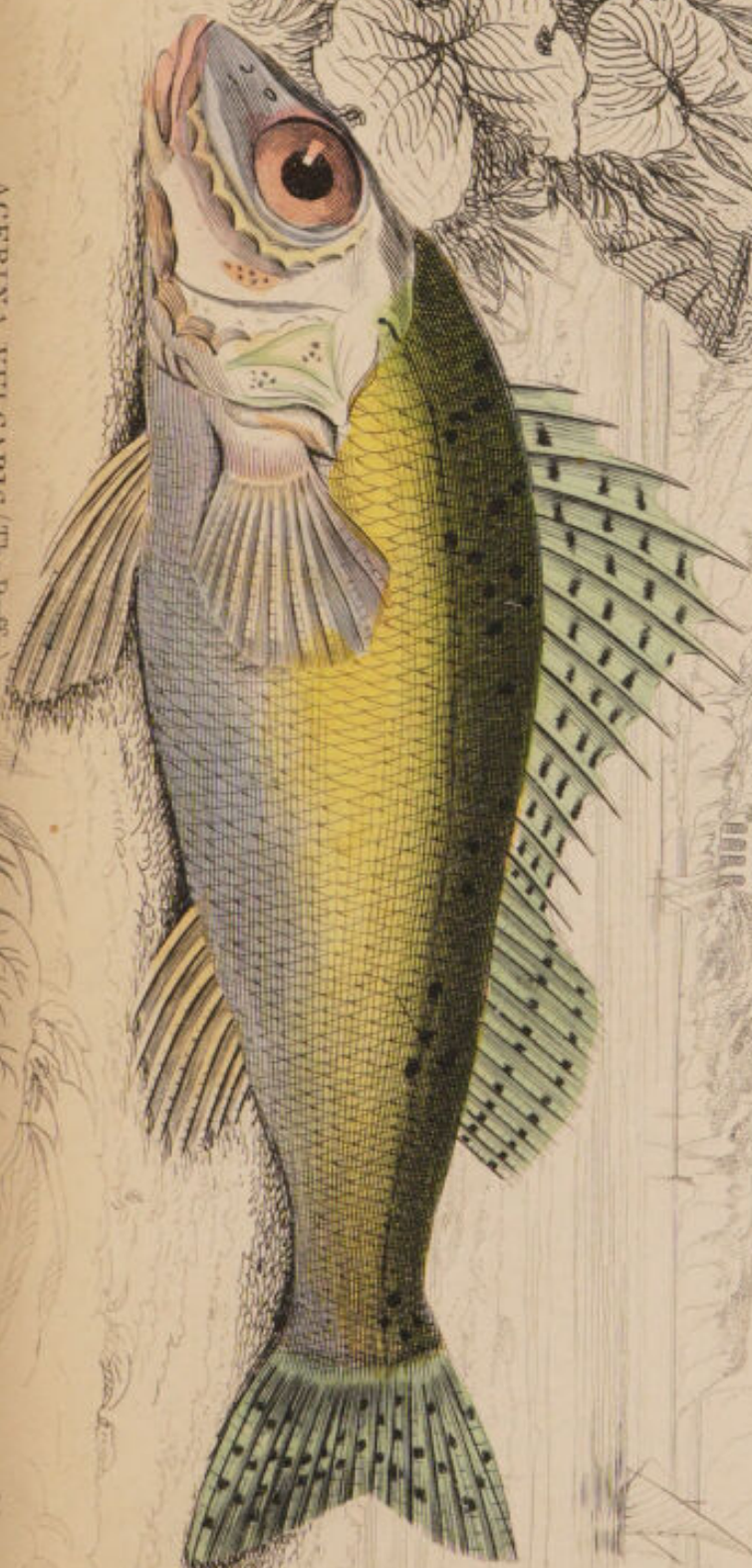




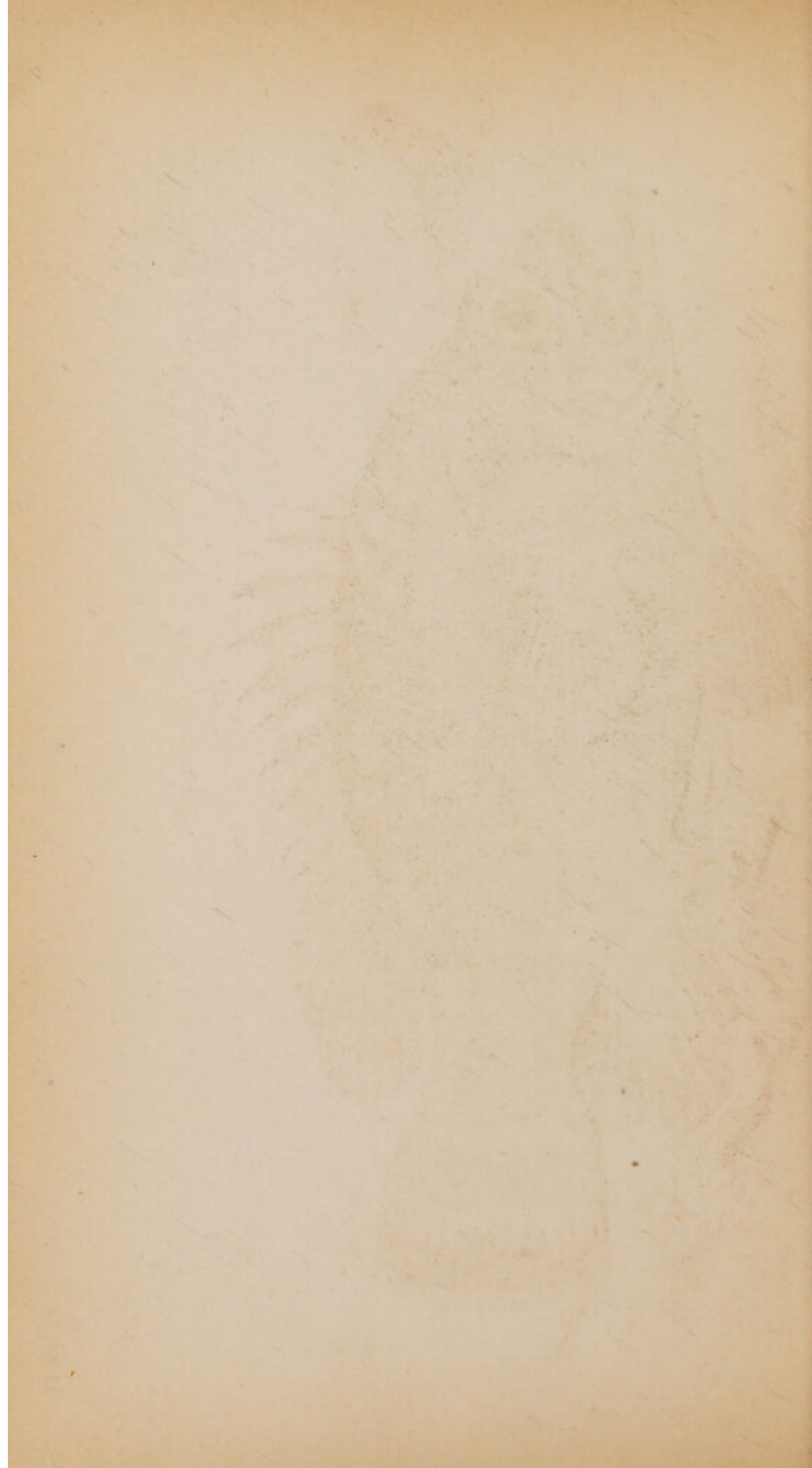


ACERINA VULGARIS (The Ruffe).  
(From natural history.)

L. x. 1. 1. 1.







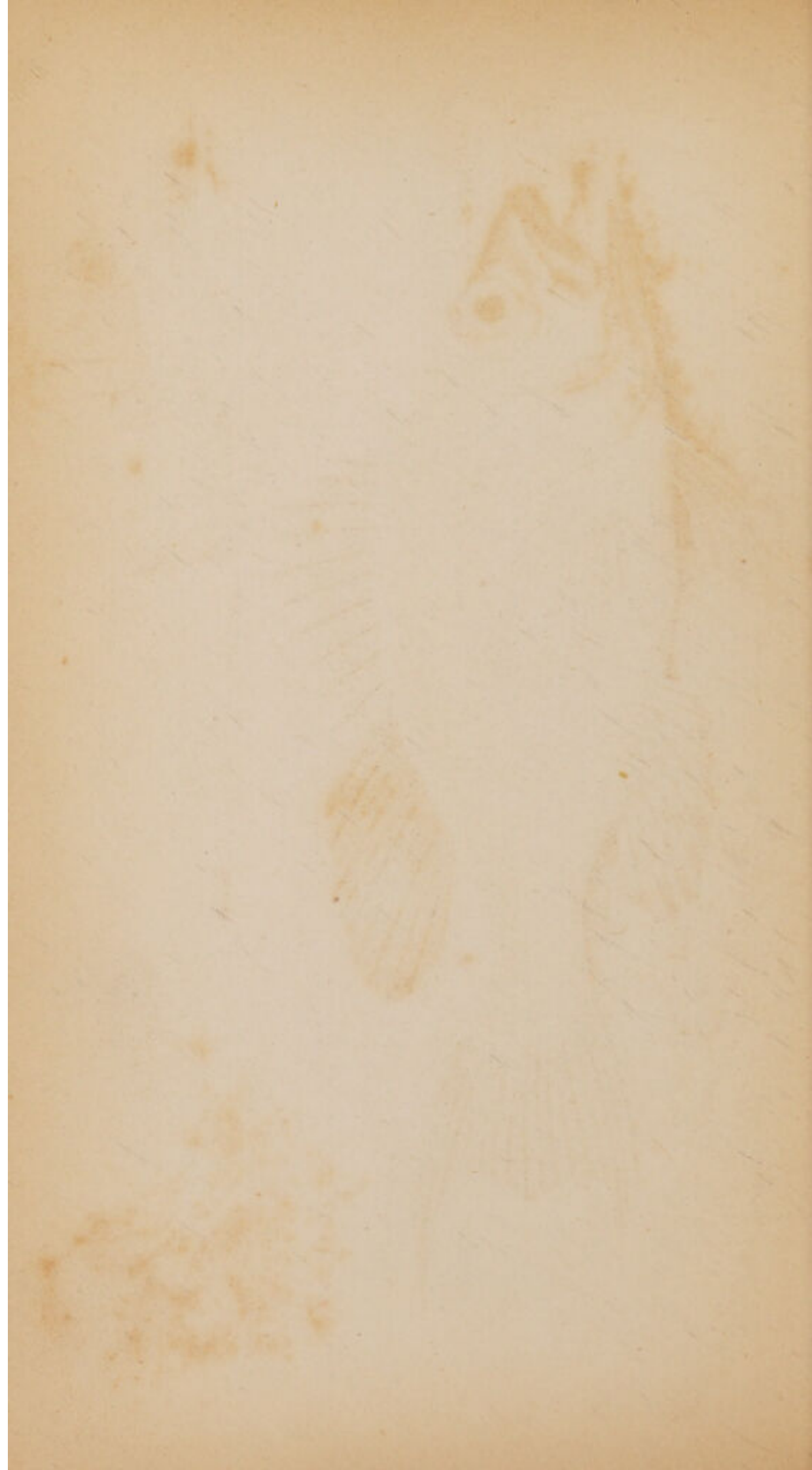
POLYPTERON CERNITUM

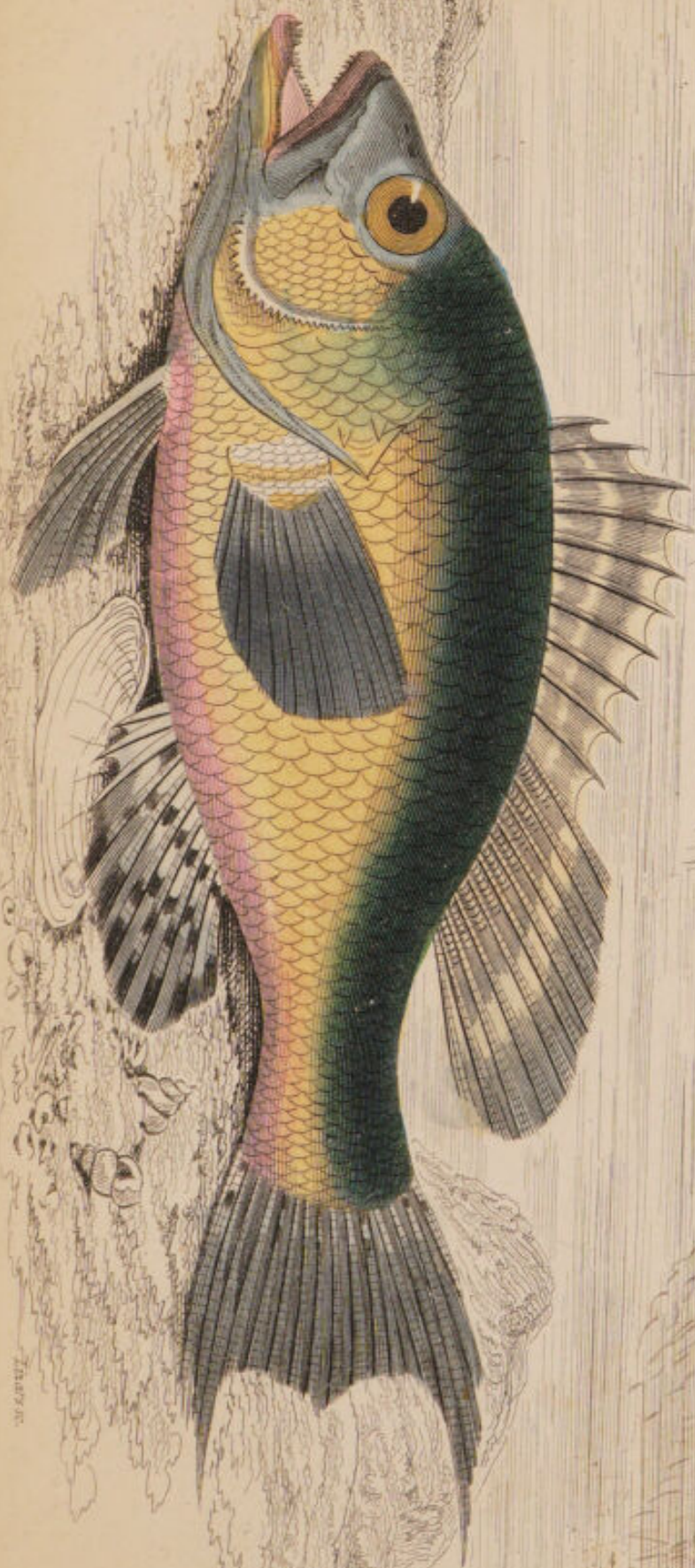


Leach's

PLATE 27

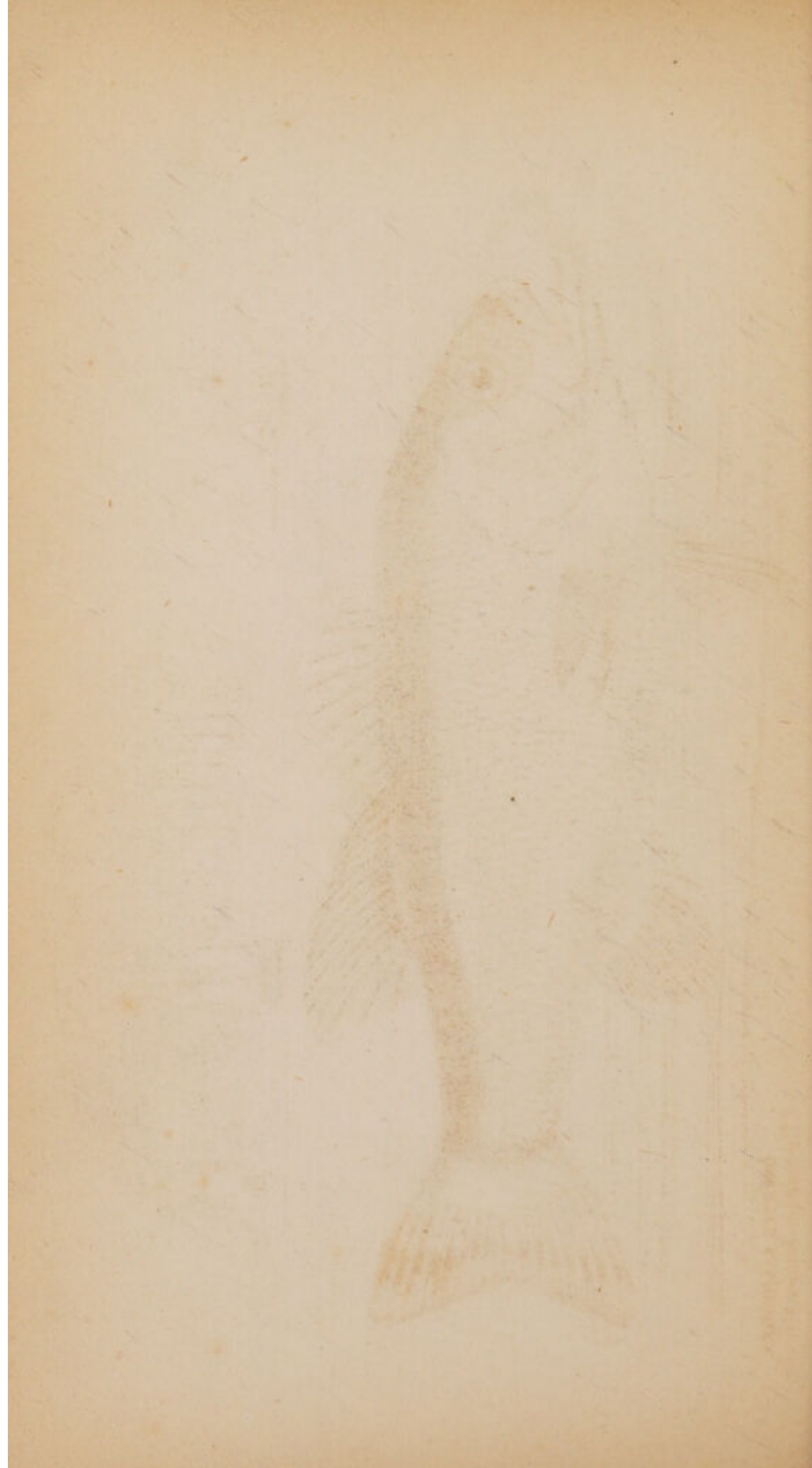






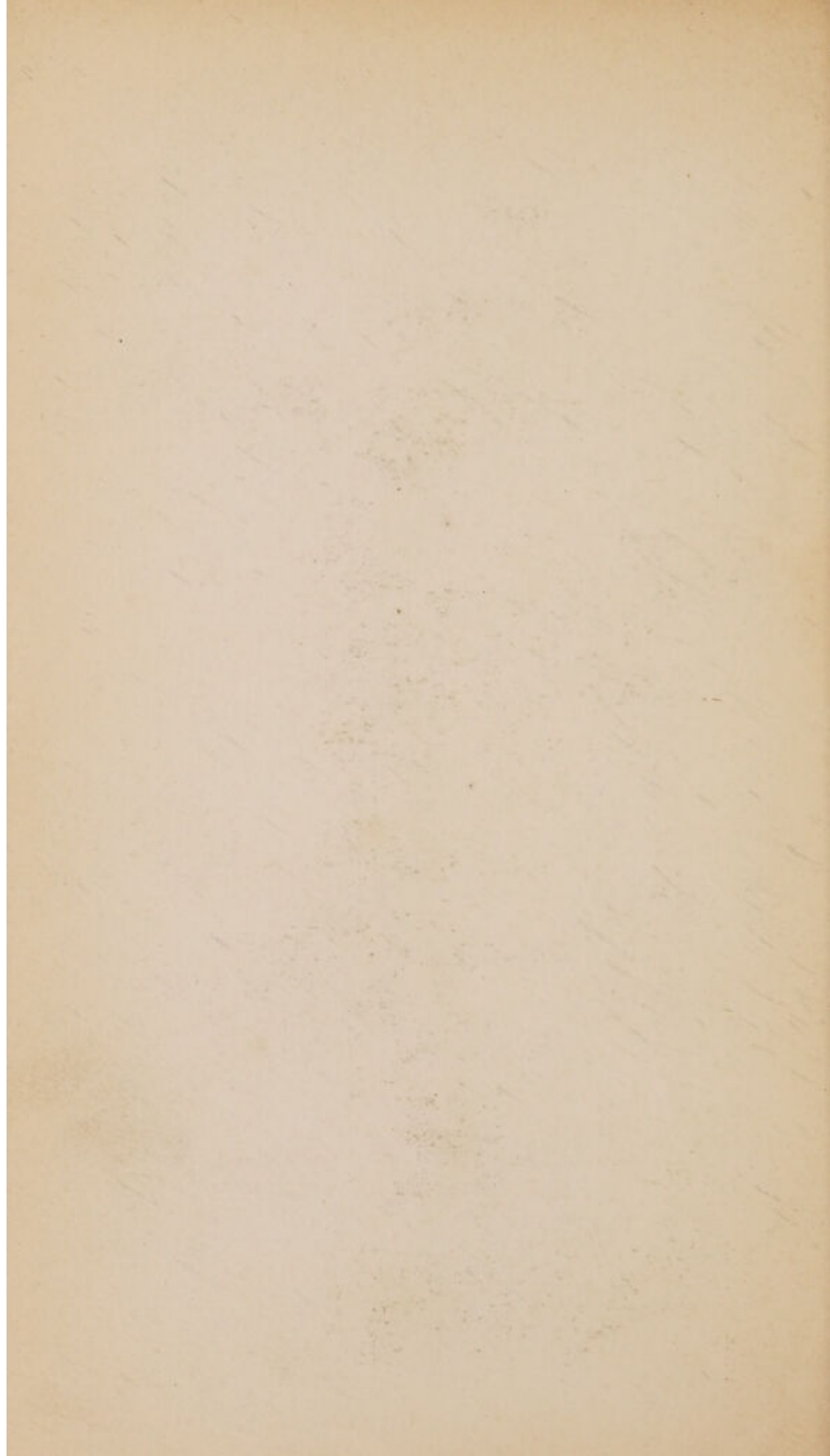
CENTROPOMUS NIGRIFRONS.

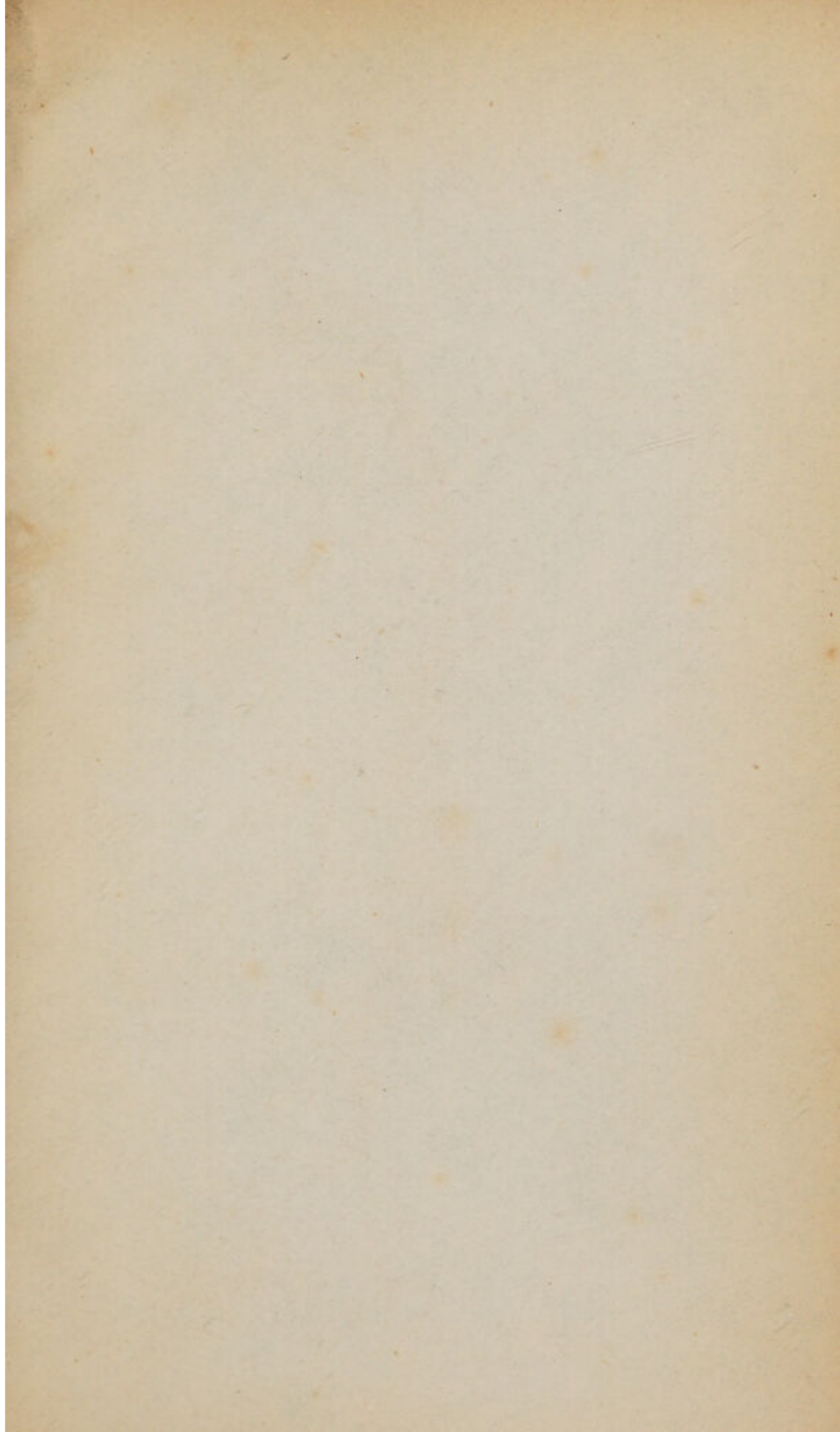




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