

F. Day, Esq., F.L.S., on Why is fish so dear?

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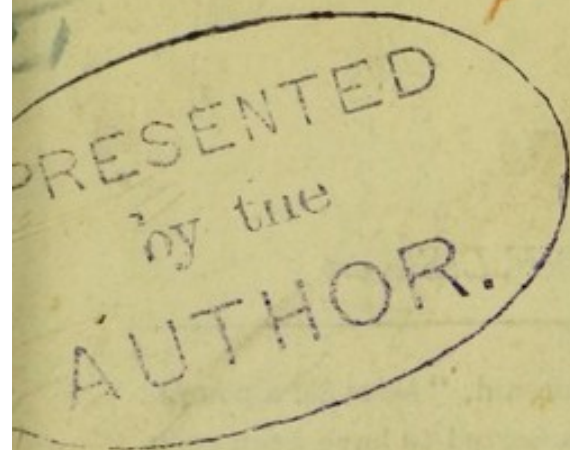
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CHELTENHAM

NATURAL SCIENCE SOCIETY

F. DAY, ESQ., F.L.S., ON "WHY IS FISH
SO DEAR?"

The Seventh and last Meeting of the present Session, which was fully attended, was held as usual at the Assembly Rooms, on Thursday last. M. Le Blanc presided. At the conclusion of the formal business, Mr. Day read the following Paper on—

"WHY IS FISH SO DEAR?"

A few months since as I leisurely strolled along the High-street my attention was attracted by a placard headed "Great International Fisheries' Exhibition," and as I was thinking of its origin, of the essays it had elicited, and the conferences which had been held there, I was suddenly stopped by a friend emerging from a fishmonger's.

shop, "Is it not monstrous," he said, "soles 3s. a pound and the Fisheries' Exhibition asserted to have been such a success, what has it done for me? Why are fish so dear?" A little while subsequently I met our energetic secretary,* and on his asking me whether I had any paper I would read before this Society, I replied that I had not, unless he would wish me to reply to the popular question, "Why is fish so dear?" and so it came to pass that it has devolved upon me this evening to endeavour to answer this inquiry, interesting to the housekeeper, and more especially to the poorer residents of our towns and rural districts. For if due to the effects of laws enacted under erroneous notions, wholesome food is placed out of the reach of the masses, but which would be obtainable by them did salutary regulations exist, it seems to me that permitting such to continue would be removing the error to within the category of a crime. On various sides and from different quarters we hear the cry that fish is now so dear. Some persons believe such to be due to a combination or ring among fishmongers to keep up or enhance its price, and have inaugurated co-operative fish stores as a remedy, but with what success perhaps some of the shareholders will inform us. Others draw attention to

* The secretary of the Cheltenham Natural Science Society, the paper being read at the last meeting of the Society.

the railway rates as exorbitant on some of the lines. Again we are told that insufficient accommodation at large markets, as Billingsgate, is injurious, because the land-borne fish are frequently detained so long in Thames-street that they are unfit for human food on delivery, while the water-borne fish have to be sold by auction as landed, consequently the purchaser is unable to examine the boxes prior to completing his bargain, and it does not infrequently happen that the lower layers (as in soles) are smaller and inferior to the upper ones. Doubtless these and several additional reasons might be brought forward, all tending to show how the price of this description of food is raised before it reaches the consumer, but still I do not intend to deal with such minor causes, some of which press severely in one own locality, others in a different place, but to confine my enquiry to whether there is anything at work in the mode in which our fisheries are conducted that is really at the root of the rise in the cost of the article. In short, have our sea fisheries during the last twenty years been worked upon true economic principles? I will commence my enquiry by investigating whether the fish in our waters yield as abundant a supply as they did in bygone times? For should there be any appreciable diminution such would augment the price. I propose dividing this into two portions : first, respecting those of

the freshwaters, and, secondly, those of the sea. Doubtless, among our freshwater fishes, augmented populations have necessarily led to a decreased supply, because certain unfavourable changes as regards fish life are bound to take place. As populations increase land becomes more cultivated and better drained, towns spring up along the banks of rivers, because these pieces of water formed highways prior to the construction of roads. Next, surface drainage and, subsequently, sewerage becomes emptied into the stream, and finally manufactories arise, the owners of which find it cheaper to utilise rivers as the receptacle for their poisons and their refuse than to deposit it in pits and other innocuous ways. Thus for private benefit our streams become more or less poisoned, and as a natural consequence the amount of life contained therein must decrease, and water instead of providing an augmented supply of food to an increasing population, becomes, as years roll on, more and more depleted of fish. Many believe, and their numbers appear to be augmenting, that legislative aid must be invoked to remedy what the Legislature itself has to a considerable extent occasioned, by first tolerating, and subsequently legalising, flagrant abuses. Or, should this not be possible, that our rivers must by artificial means be annually supplied with fish by means of artificial fish-culture, in order to

compensate for the unnatural and suicidal depletion which is being effected by man. It has been advanced by one section of the public, especially by such as are interested in leaving things to remain as they are, that doubtless to the general consumer fish is somewhat dearer than it was, but still the price has merely advanced in common with other articles of food, and that the supply is equal to, if it does not exceed, that of former periods. That legislation has effected, during the last ten years, a considerable increase in the number of rough fish can hardly be denied, but this is, perhaps, more for the benefit of the angler than of the consumer: the seeker for recreation and health than the man who fishes for a means of subsistence. We are told salmon have increased, and that the English supply, which was valued a quarter of a century since at £18,000 per annum, has now risen to £150,000 per annum. Maybe it has, but our question to-day is, whether if our laws for the protection of salmon were more effectually carried out, would not the supply be doubled and the cost lessened? Were standing implements of captures (which have been declared a public nuisance at common law) to be put down would not this have the desired result? Why, we may enquire, is the good of the many to be sacrificed to the greed of the few? If we look at the fresh water food fishes, where are the flounders that formerly abounded

in the Severn, and which, in years gone by, I have personally captured when angling at Shrewsbury and higher up the river? Gone! That stream may be practically said to know them no more. Where are the large shoals of shad that once disported themselves on the upper fords, affording recreation to the angler and food to the neighbouring residents? They, likewise, have diminished to such an extent that these shoals may be said rarely to be found above Worcester. Where are the large lampreys so common in the river above Tewkesbury that an old resident left directions in his will that the trustees of a charity which he had endowed were to confine their annual audit dinner to two dishes of the cheapest food, specifying lampreys as the form of fish to be supplied? Now it is a rarity which costs about 2s. 6d. each. Where are the small river lampreys or lamperns that used to ascend the Thames in such quantities that the Dutch eod and turbot fishers annually exported them to such an extent that they have expended as much as £4,000 in one year, when giving for them from £3 to £5 a hundred? All these fishes may be said to have their progress up the rivers, which they ascend to breed, partially or entirely arrested by weirs or other obstructions, leaving a residuum to be captured in tidal waters. And yet we are told, and expected to accept the statement as correct, that there is no decrease in our fish. Time will not permit me to

enumerate every species which has been more or less destroyed in our fresh waters, so I will confine my remarks to the salmon, the king of our fresh water fishes. Doubtless a difficulty meets us at the outset as to statistics. We possess, it is true, salmon commissioners, who make a yearly return to Parliament of the amount taken during the preceding season in England and Wales; but fancy appears to be permitted to fill such in, should facts be wanting; or, as observed by the assistant to the Inspector of English salmon fisheries, "at the present moment the only fisheries of which we have anything like really useful statistics are the Scotch herring fisheries, less complete returns are furnished of the cod and ling series of Scotland; and approximate returns of a very imperfect character are supplied in regard to the English and Irish salmon fisheries. Beyond this, all is mere conjecture." Consequently if I lay but little stress upon these annual returns, it must be held as my excuse that we have been informed they are simply approximative, of an imperfect character, and the remainder being mere conjecture! If salmon are now as plentiful as in times gone by, where are those of the Itchen, the Stour, the Medway, and the Thames in England gone? Those rivers have been deprived of their fish. The Fifeshire Leven in Scotland no longer contains salmon, neither in the Tay district do the Almond, Ericht, or Dighty; in

short, in seven counties rivers formerly frequented by them are ruined from pollutions, obstructions, and poaching practices. Turn to Ireland, and Mr. Blake reported of his district, extending from Wicklow Head to Rossan Point, that, due to pollutions, nearly every river in county Down has been destroyed as a salmon producer. If we now review the condition of the salmon supply in years gone by, we find it stated in Counsell's *History of Gloucestershire* that a standing condition of apprenticeship was that the apprentice should not be compelled to eat salmon more than thrice a week. The same stipulation, but respecting which evidence is still traditionally existent, would tend to show that this law was in force in many localities. The Cromwellian trooper, Captain Francks, writing from Stirling, remarked that the burgomasters (as in many other parts of Scotland) are compelled to reinforce an ancient statute that commands all masters and others not to force or compel any servant or apprentice to feed upon salmon more than thrice a week. At Inverness, a century later, Burt states that salmon sold at one penny a pound. We must, however, be cautious when comparing the price charged a century since with what obtains now, not only because of the altered value of money, but likewise of the many disturbing influences which have sprung up. We have new methods of packing—especially with ice, improved roads

the use of railways and steamboats, which distribute the fish to districts that previously never participated in the supply, and which carry off to distant places what in olden times formed a local glut in the markets along the banks of salmon producing rivers. On the other hand, salmon affords an example of a fish which, owing to increased facilities of carriage, has become much cheaper in London than was formerly the case. Most of us remember the tale of the Scotch laird who, on arrival at the metropolis, ordered dinner for himself, but a simple steak of salmon for his attendant gillie, and was more than surprised at finding the latter's repast charged at one guinea. Pen-
nant, writing in 1776, informs us that the Tweed salmon were sent fresh to London in baskets by sailing vessels, but should the craft be delayed by contrary winds, the fish were re-landed, boiled, pickled and kitted, and thus despatched, while other fresh ones replaced them in the baskets; while to pay the expenses of the river fisheries he estimated that it would be necessary to capture 208,000 fish annually. In the year 1882, 1,412 cwt. of salmon were sent from the Tweed to London, and estimating each fish at 10lb. weight, we obtain the number of 15,814 salmon; in fact, the entire weight of salmon received at Billingsgate in 1882 from the whole of Scotland was 22,968 cwt., or 257,241 fish of 10lb. weight each, but as in 1776 the Tweed alone re-

quired 208,000 fish to pay its expenses, such shows the enormous falling off in supply which must have taken place. A rough computation of the destination of the Tweed salmon would perhaps be, that about half the produce of the river goes to London. In short, on comparing the supply of fish from our rivers to what was obtained a century ago, the unbiassed enquirer finds annihilation of the race of salmon in some waters, and a diminution in all, or nearly all, of the remainder. The processes by which this has been brought about I will now endeavour to briefly recount. They may be summed up under the heads of weirs, pollutions, and unfair modes of fishing. Weirs or dams were first constructed across streams for the purpose of raising the level of the water in order to work a wheel; and as the channels of communication between one part of the country and another began to be diverted from waterways to highways by land, less notice was taken of obstructions on our rivers, and these "kidelli," denounced as a public nuisance in Magna Charta and as such ordered to be destroyed, again commenced rearing their heads above the water and obstructing fishes from reaching their breeding beds. During the last century pound-locks for the assistance of navigation came to be introduced into such of our rivers as were previously unnavigable or merely so in certain places, and thus it came to pass that dams crossing rivers were no longer

under a ban. Water has likewise been abstracted for canals, to supply the requirements of large towns or for the use of factories and mines. But if weirs have prevented the ascent of breeding fishes, poisons have rendered many rivers watery wastes, dangerous for men and cattle to drink from, impossible for animals to remain in and live. Some of these poisons are due to drainage, some to mines and factories returning, in a poisoned condition, waters into our streams which they had previously abstracted in a pure condition. But space will not permit me to give even a brief list of all the various causes of river pollution. I must cursorily glance at unfair modes of fishing, for rivers merely hold a limited supply of fish, and should a disproportionate capture be made at one spot among the migratory shoals, this unduly diminishes the share which would otherwise accrue to the owners of fisheries in the upper waters, and among unfair modes all fixed or semi-fixed engines, however constructed, should be included. It is not of much use to declare all fixed engines illegal, but to exclude some few from the list; for such augments the take at these favoured places, and it largely increases their unearned increment. Close seasons, and the destruction of many standing engines, have certainly augmented the quantity of salmon captured. But it has been asked, "Why is it that after a few years the produce appears to come to a standstill, or even to begin to fall

off?" The answer may readily be found: as these rivers become more prolific, due to any cause, an increase of fishermen occurs; and along the sea-shore or in estuaries either more killing methods are resorted to, or nets are too frequently used. Then the netsmen in the lower waters of the rivers complain, and they obtain concessions; and these concessions allow them to still further deplete the stock. It almost seems as if, in the interests of the general public, the time will come when the entire fisheries of a river must be vested in a single body, whose interest it will be to increase its productiveness for the benefit of the entire community, giving the proprietors a *pro rata* share in the profits. The second portion of my subject relates to our sea fisheries which furnish far more fish as food than do those of our fresh waters. These sea fisheries are sub-divided into *territorial waters*, which are such as extend three miles from our shores, and *international waters*, or those beyond the three mile limit. The first are subject to any regulations which our legislature choose to impose, whereas the open sea is only amenable to international codes. The history of most sea fisheries is much the same. As man increased in numbers or as food became more difficult to procure, the hungry savage doubtless in times past acted as do the Andamanese of the present time. Those living along the coast first obtained

such forms as were readily captured in the shallows or were left there by a receding tide, to assist which he erected pounds, over which the sea flowed, but as it receded the water filtered through the rocky barrier, causing the fish which had been carried over with the flood to be left high and dry with the ebb. He pursued them with spears, he shot them with bows and arrows, and then he made his pounds more effective by employing nets at their outlet. But the sea is not inexhaustible and the time has almost everywhere arrived when augmented captures have become necessary, and then man has been compelled to venture further out, to dive after his prey, to float on the stem of an old tree or on a log, or to fasten several together for this purpose; and lastly, to fish from boats with nets or other appliances; but the necessity of obtaining an increased supply has necessitated proceeding further out to sea, which necessity would not exist were the fisheries inexhaustible. The very history of sea fisheries demonstrates that such as are in-shore, when left free to all, have in time become insufficient for man's requirements. We in these islands possess no immunity from the general laws of Nature. If we permit indiscriminate scramble among the finny tribes along our coasts, if free fishing is to degenerate to unlimited slaughter of everything, irrespective of size or season, what result can

ensue except depletion of fisheries? And where would this depletion first show itself but in localities nearer to man or along our shores? Here it will be as well to enquire whether there exist any signs which would denote a falling-off or deterioration in sea fisheries? When the supply commences to diminish, and the fisherman begins to decrease the size of the meshes of his nets; when the fish supplied to the consumer begin to be of a smaller or younger size; when more hands or appliances (having increased killing powers) are found necessary to capture an amount of fish that previously was obtained by fewer fishermen and readier means; when it is necessary to go further out to sea than previously in order to secure the captures, then a doubt must arise whether the condition of a sea fishery is satisfactory. But when we speak of sea fish we must not lump all sorts into a single category, and believe that because one form is abundant, therefore every one must be doing well; for the habits of all are not the same, some being nearly stationary or local, others more migratory. All of us are aware how practicable it would be to destroy our thrushes and our blackbirds, our pheasants and our partridges, were man permitted to kill them as he pleased and at all seasons to find a ready market for his spoil. But how different would be the result did man attempt to annihilate, in these isles, our fieldfares and our redwings,

our snipes and our woodcocks, these latter being only visitants. The extinction of a local race may be comparatively easy to that of destroying visitors, as these last would be more readily scared away. An augmented capture of fish is not an invariable sign of improved state of a fishery, for though it might be owing to the spot having been previously insufficiently worked, it may also be consequent upon an undue amount of young fish having been taken, and which ought to have been left for the next year's supply. Also it is possible, if mere weight is considered, that inferior forms, which previously were scarcely considered fit for human food, are being introduced into the market. Thus Montagu, writing from Devonshire in 1809, tells us that large rays and skates were never eaten, unless in times of scarcity, when some very small ones were by fishermen's families, but were never offered for sale. The use of these fish was for baiting crab-pots, for which purpose each boat required four tons annually. But now the crabber must employ dog fishes; the rays and skates go to swell the gross weight of fish received at Billingsgate, respecting which all information is refused. It is thus apparent that when investigating the food supply, the investigator should understand what classes of fish are being referred to, because an increased gross weight (if due to inferior kinds finding their way into the market) will not reduce the

cost of the better forms. And the mere division into (1) round fishes, as cod or herrings, which do not usually remain at the bottom, and (2) flat fishes, which generally remain at the bottom, as soles or turbot is unsatisfactory and almost misleading. Among the better forms are those which are seen most frequently at fashionable fishmongers. We may perceive (1) visitants to our shores arriving in immense shoals, as herrings or mackerel, more or less surface swimmers, and commonly taken by drift nets, while their forms are round ; (2) mid-water or bottom feeders, which are predaceous, largely captured by line fishermen, as the cod and its allies, their forms also being rounded ; (3) ground fishes, which mostly keep to the bottom and are largely taken by trawls, as the soles, plaice, and other flat fishes. One of these forms may not only be exterminated without injury being inflicted on another, it might even be to its positive benefit. Thus, cod are destroyers of herrings ; were the cod exterminated such might contribute to an increase in the herrings. It is the same in birds ; were all rapacious forms to be protected such would scarcely conduce to the increase of non-predaceous species.⁷¹ Theorists who work at fisheries in the library or in the museum, neglecting to likewise obtain information in the boat and among fishermen, are hardly in a position to be good authorities upon their requirements, while they possess a stock

argument against protecting sea fish, which, if analysed, is diametrically opposed to their views. They warn us against upsetting *the balance of Nature*, prognosticating fearful ills will follow all man's attempts at interference with fish. They hold that sea birds and land birds should be allowed some consideration in the breeding season, and the young should not be ruthlessly destroyed. Even the fox has its time free from molestation; such is also admitted to be necessary for fresh water fish, but for marine ones? *never!* Now the very essential nature of sea fisheries, as now carried on, is to interfere with the balance of Nature: a remuneration is offered to those who bring eatable fish on shore, while their destroyers, as porpoises, sharks, dog-fishes, and their allies, not being marketable commodities, are let alone. The destroyer is virtually protected, while a price is put upon the heads of the better kinds of the finny tribes. It is no one's business to kill the vermin of the sea; how then can leaving fisheries to be worked as is now done be leaving the balance of Nature alone, for to do such all forms of fish should be equally captured and killed by the fisherman. Another reason adduced for sea fishes not requiring protection at any period of their lives is, that they deposit so many eggs, and that these will suffice to meet all and every device man may use in order to effect their capture. Here the zoologist may well inquire whether breeding in fishes

and eatable molluscs is different from what obtains in the rest of the animal kingdom, wherein the powers of increase have been apportioned to the needs of the individual, for where man has interfered, as in birds, ground game, seals, &c., protection has had to be afforded to prevent annihilation of the species? It would seem that the various sizes, modes of deposit, numbers, &c., of fish eggs must be on some definite plan, not a chance medley destitute of any order, and deficient of any scheme. We observe, as in many other forms of life, that the more voracious class, as sharks and rays, have fewer young than the herring and the mackerel, and until the contrary is proved, we are justified in assuming that where the most numerous eggs or young are produced by a given species, there the greatest destruction occurs, and that fish are no anomaly among the vertebrate creation, but have sufficient ova only for the purpose of compensating for normal loss, while among normal losses, captures made by man should not be included. The inexhaustible theory of fisheries is certainly pleasing to the ear, but theory and practice have been, and are, at a perpetual strife, and in many circumstances of life the former has to give place to the latter. It may possibly be asked whether all alterations in the laws of sea fishing have not been made subsequent to the reports of Royal Commissions, and in accordance with their recommendations? To this I must give an affirmative

reply, and as a consequence two more questions arise: (1) What have been and are the composition of the Royal Commissions on fisheries? and (2) on what grounds do they offer their advice? As to the composition of Royal Commissions the following is the opinion of Sir Lyon Playfair, as stated at a conference on fishery questions in 1883:—"He was Chairman of the Royal Commission for examining into the herring fisheries of the British coast. Why he, a chemical professor, should be found in that position he could never fully understand, especially as there was on the Commission a man of European eminence and one of the greatest authorities on fisheries: though they both were in the same galley, and he sat at the helm, it was the vigorous power of his friend Professor Huxley who not only impelled the bark but also directed it." Now although I have no intention of criticising individual opinions, still it will be interesting to trace how this Commission came to the conclusion that most of our fishery laws ought to be abolished as old-fashioned, and the sea fisheries be left to a simple scramble. A Royal Commission was directed to investigate into the condition of our sea-fisheries, and the three members of which it was composed commenced their enquiries on September 22nd, 1863. They visited 86 localities on the coast and elsewhere, consisting of 41 places in England, 24 in Scotland, and 21 in Ireland. They appeared to have remained

about one day at each, and have left no record whether, during the whole of this period, any one of them ever visited the nets or lines at sea, or even passed a single tide on board a trawler; subjects of the highest importance to know, and for the following reason. If, as seems most probable from the minutes, they confined their investigations to the evidence brought before them, they must have framed their report on such or else by preconceived theories. "But," observed Professor Huxley, "I discovered that the practical fishermen, as a rule, knew nothing whatever about fish, except the way to catch them;" while the Commission reported, "nor do we know enough of the number, the mode of multiplication, or the conditions of existence in any locality of any kind of fish, to be able to form the slightest estimate as to the effect which will be produced upon the number of that fish by a given amount of destruction of its young. We are thrown back wholly upon the result of practical experience, and unfortunately it is in most cases very difficult to obtain these results in a trustworthy shape." But the testimony of the owner of some trawlers was accepted, that five of his vessels in one night landed 17 tons of fish from the Dogger Bank, and from this it seems to have been argued that five trawlers obtained in one night an amount of wholesome food from an area of 50 acres equal in weight to that of 50 cattle or

300 sheep. And then, generalising, we are informed that the produce of the sea around our coast bears a far higher proportion to that of the land than is generally imagined. It has been unsuccessfully suggested that five trawlers ought now to be sent to the same trawling ground at the same time of the year as the five reported upon, and the result recorded, in order to ascertain whether continuous trawling has or has not impaired their prolificness. Returning to the state of the British sea fisheries, as reported upon by the Commission, we find them remarking "we have no difficulty in coming to the conclusion that on the coasts of Great Britain the supply of fish is increasing, and that it admits of progressive increase"; while they frankly tell us that, with the exception of the Scotch fishery statistics, "there are no means of ascertaining, even approximately, the annual yield of fish on the coasts of the United Kingdom." They concluded that as they had ascertained next to nothing, the Fishery Boards of Scotland and Ireland should be at once abolished. "That all Acts of Parliament which profess to regulate or restrict the modes of fishing pursued in the open sea be repealed, and that unrestricted freedom of fishing be permitted hereafter." Trawlers were considered to have been maligned; the oyster famine was deemed certainly not the result of over dredging, nor occasioned by any cause over which man has direct con-

trol, but from a general failure of the spat or young ; so restrictions were to cease, and likewise over most of our inshore fisheries. Having proposed abolishing all the sources from whence statistics on fisheries were being collected, the Commission suggested that statistics should be systematically collected for the purpose of arriving at trustworthy conclusions regarding the effects of the modes of fishing which were in use : a sensible proposition which has not yet been acceded to. This Commission did not report upon any of the signs which would denote the condition of the fisheries, but merely taking a gross weight of fish (mostly herrings) as a guide, were able to assert that the amount of captures were increasing and capable of still further augmentation. And as since their recommendations were mostly passed with law, nearly 20 years has elapsed, we will venture to enquire what benefits or the reverse have accrued from the legislation adopted. It has been asserted that although central fish markets may be more fully supplied than formerly, a largely increased number of men, boats, and nets has become necessary for this purpose ; that our inshore fisheries are less prolific ; that our flat fishes are rapidly diminishing ; that the average size of our sea fishes (except such gregarious forms as mackerel, herring, &c.) are lessening ; while inferior classes, such as skate, pollack, &c., are obtaining positions they never would have had had our

fisheries been worked on economic principles, and our better forms of fish not been wastefully captured. Fishermen, it must be remembered, supply two classes of fresh produce ; the first as lobsters and crabs can be sent from abroad, but not so fresh fish to any considerable extent, consequently the price must be in a proportion to the supply. Should such be small, the fisherman receives a commensurate augmentation in money : he is no loser, it does not signify to him if the market is insufficiently supplied. Should quantity merely be desired he can send inferior sorts. As to our native oysters we may well enquire what has become of them? Gone, we are told, owing to deficiency of young, in consequence of some inscrutable meteorological condition ! and we are informed as a balm, that the price has risen so much that the oyster dredger is scarcely a loser. Another class of observers assert that they have disappeared, due to no regulations now existing for the protection of the beds, rendering it no one's business to look after them, but merely to obtain as much as they are able, and here they work their sweet will until the locality has to be classed among those which are used up. Would it be in accordance with the dictates of common prudence were any individual to stock an oyster bed from which anyone might take the molluscs? In Holland investigations into the natural history of the oyster have been instituted, for the Hollanders, not

satisfied with the assertion that nothing could be done, wished to know why? They found it to be overdredging, and by means of regulations they have re-established a supply in places where the greed of man had almost destroyed the breed. Look at our mussel beds. We are told they are showing signs of annihilation, and as fishermen depend greatly on mussels for bait it is supposed they must give up line fishing and take to trawling! Little is done to regulate these fisheries than which nothing could be more readily accomplished, for when tried it has been a great success in private hands. We now have to consider crustacean forms as lobsters and crabs, wherein the most advanced advocates of the let-alone system are unable to lay this diminution to meteorological conditions. It cannot be too widely made known to consumers that in sea fisheries, as of lobsters and crabs, a foreign supply keeps down the price and as a consequence it is necessary to the fishermen to preserve these fisheries in a tolerably fair condition in order that with prices restricted to within a certain amount (due to the foreign supply) they may be able to supply the market. This occupation can be undertaken by old fishermen and others not of sufficient physical strength to engage in the more laborious work of fishing with nets in the open sea. Along the east coast of Norfolk the fishermen, about eleven years since, finding

that they might capture lobsters and crabs in any way and to any extent they pleased, commenced to take small crabs and the number of large ones yearly decreased until it appeared as if the time were rapidly approaching when there would be no more large crabs to take. They began to realise the fact that the sea is not inexhaustible and great alarm set in. The fishermen petitioned to have some enactment framed which would be binding on all, and the rules they approved of were finally sanctioned, and came into force in February, 1880. The following are the amounts of these crustaceans yearly taken at Cromer, and sent to the railway :—1879, 668 peds; 1880, 656 peds; 1881, 2,066 peds, and in 1882, 3,063 peds—in 1882, 400 more peds were sent by water, making a total for the year of 3,466 peds. The regulations came into force in February, 1880, and so would not benefit the fishery that year, in fact it continued its downward course. But the result of saving breeders, small crabs, and soft ones (or those which are changing their shells), commenced being apparent after a few months. The captures trebled in 1881 to what they had been in 1880, while in 1882 another great increase occurred, which, in fact, equalled the whole of the captures during the years 1879 and 1880. The number of peds (which prior to the order averaged 662 annually) immediately rose to the average of 1,397

peds, and were still showing an upward tendency in 1883, when a continuation of the regulations was solicited. Here an injury was pretty clearly traceable to over fishing, while benefit resulted from restrictive enactments, and after two years of trial not a voice was heard to deprecate a continuation of the restrictive order of the Board of Trade. I will now pass on to a form of trawled fish, the sole, and if as we are assured is the case, that fish has not augmented in price more than other articles of consumption, surely market returns would form the best basis on which to argue. But we are told they cannot be procured. Fortunately, I have found such recorded in the *Birmingham Daily Post*, giving the wholesale cost per stone in that town, and I have extracted some of the figures. Her Majesty's Commissioners gave us the daily cost at Manchester of soles during the ten years ending 1865, restricting their figures to the month of January, and showing the retail cost per pound. They also observe that the difference between the wholesale and retail prices is about one third. I have similarly treated the Birmingham figures, adding one third to the wholesale cost, thus rendering the plan of investigation the same. At Manchester, during the ten seasons ending 1865, the lowest cost of soles per pound was 3d., the highest 10d., or a mean of 6½d. At Birmingham, during the three seasons ending 1884, the cost has been, in 1882,

from 1s. 4d. to 2s. ; 1883, 1s. 4d. to 2s. 8d. ; 1884, 1s. 4d. to 2s. 4d., or from 1s. 4d. to 2s. 8d. a pound, or a mean of 2s. a pound. It seems fair to suggest that if prior to alterations in the fishery regulations these fish never exceeded 10d. a pound, while after fifteen years trial of new plans they have never been less than 1s. 4d. but as high as 2s. 8d. a pound, the time has arrived when some impartial investigation ought to be instituted as to whether this great additional cost is due to augmented cost of capture, diminished supply, or increased charges. Mr. Ansell tells us we possess 3,000 deep sea trawlers, the average catch of each of which is 100 tons per annum. The Commissioners of 1866 gave us an example of five trawlers capturing 17 tons of fish in one night, or 20 tons a week, of six days, each vessel, which, multiplied by 52 weeks, would give 1,040 tons per annum each trawler, or the oft-quoted five vessels in one year, at the foregoing computation, would take an equivalent to 53 vessels of 1882. This seems hardly to bear out the inexhaustible theory of sea fisheries. Mr. Ansell also asserts that when the "silver pits" were first worked a trawler got a ton to a ton and a-half of soles in one night, of from £12 to £24 value. Now, although the wholesale price has increased from eight to twelve-fold, the take has so diminished that trawlers have to seek fresh ground. Here I will briefly remark upon trawls, or rather beam-

trawls, which are used with or without steam, and are of two classes: first, such as chiefly fish international waters in fleets; and, secondly, in-shore trawlers, which are employed in bays and shallow waters, where they rarely work in companies. The beam-trawl is a purse-shaped net, of a triangular shape, along the upper edge of the mouth of which is fastened a horizontal beam from 35 to 50 feet in length. This beam is kept off the ground by means of two iron heads, so that merely the under portion of the net and the ground rope touches the bottom of the sea when it is being towed along by the trawler. The under portion of the net which touches the ground is subject to friction, due to the weight of anything that may have found an entrance into the net, and so much so that various kinds of chafing pieces have to be added to prevent its giving way. The French even place a stout hide at this place, while the amount of pressure inside the net when being towed is so great as to cause a resistance sufficient to reduce the speed of the trawler from perhaps 8 to 1 knot. The consequence is easy to see, fish inside this bag net become more or less bruised from violence, and any young ones which enter do not escape with life. Otherwise we are told the trawler by pressure can do no injury to young fish, but experiments have never been made to ascertain this. One would imagine that a net that requires a hide along its

under surface, and containing some ton or more of contents, if scraped along over young and delicate flat fishes, must do injury. A simple experiment might be made of trying with a small trawl in the rear of one of these large trawlers when at work, and it would soon be ascertained whether it captured many injured fry, for if so they would be what had been passed over by the large beam-trawl which preceded it. If we ask for evidence respecting the effects of trawling, we find it on all sides, except in the pages of some of the commissioners' reports. Mr. Sinclair mentions two adjacent bays on the Donegal coast, in the one of which the restrictions on trawling were removed, and there are now neither fish nor fishermen, save the crews of four or five little trawlers of from three to five tons, which scrape the shallow water through the summer; whilst the adjoining bay, in which restrictions have with much difficulty been maintained, supports the largest body of linesmen in the county. These are the Bays of Donegal and Inner. The same results have followed immoderate fishing off the East coast; thus one observer remarks of the Horn Reef to Heligoland district, "We have fished there every summer, heaving big bags of small plaice on board and throwing them away for the sake of the soles, till, by destroying the young broods, full-grown plaice have grown very scarce; so now they make up with immature plaice as

the price of all has increased." Mr. Mann, writing from Bournemouth, observed, on having just weighed a sole of one ounce and a turbot of four ounces exposed for sale, sixteen pounds' weight being captured on one occasion, the largest not exceeding eight ounces. Mr. Jex, writing from Billingsgate in January, 1882, remarks upon some thousands of boxes of soles brought the preceding year, and three-fourths of each box were nothing but slips and tongue (undersized soles.) The present trawling commission at Aberdeen elicited the fact that the trawlers sell the immature fish to the manure manufacturers, who, during the last four months, had been supplied with thirteen tons. The trawls kill these fish by pressure when in the bag of the net. And when we proceed to investigate the condition of our round fishes, including the gregarious kinds which are usually surface swimmers, and the more mid-water forms, we are met with statistics to prove the folly of giving protection to these forms. Herrings, we are told, and proved to be the case, deposit from 20 to 50,000 eggs, and therefore they assert cannot be decreased. If salmon deposited all their ova in the sea, the eggs would not hatch, so what would be the use of any number? If herrings deposit theirs in the deep sea, over an oozy bottom, what will be the result? will they hatch? And if they do, will the young escape their numerous enemies? and should they come to maturity

will the progeny form a deep-sea race? The annihilation of a fishery either by the destruction of the fish or driving them away, have similar results to the consumer. What is the use of informing the public that codfishes off the Lofoden Islands approach the shore in dense masses, and then to argue that in one spot such must be a square mile in superficial extent, and if each fish took four feet of water, then the space must contain 120,000,000 of cod?—consequently no protection is needed. Or that vast shoals of herrings are in the ocean, if man only knew how to take them? It is the present condition and future prospects of our fisheries as a whole that concern the consumer. At the commencement of this century herrings were so abundant along the north-east coast of Scotland, and came so close in shore that numbers of them were caught by people standing on the rocks, having no other implements of capture than baskets tied on long poles. To be of use now, those poles would have to reach from sixty to one hundred miles from shore. I have now endeavoured to show how the oysters have gone, and the mussels are rapidly following the oysters; how the crabs and lobsters have likewise diminished, but how protection has amply repaid the small amount of trouble which it has cost, and without injury to anyone. I have given my reasons for supposing that our flat fishes (as soles) are not in a satisfactory condition, and I have

asserted that unrestricted fisheries do disturb the balance of nature, because only the eatable forms are captured, and, as a consequence, are the only ones sought after by the fishermen. I now come more particularly to round, surface-swimming fishes, that arrive on our shores in countless shoals, as the herring. Here our first enquiry is not into whether these fishes can be reduced in numbers to such an extent by over-fishing that they require protection, but whether, due to unnecessary modes of fishing, the herring is being gradually driven further from our shores, compelling fishermen to follow them much greater distances, thus increasing the cost to the consumer and the danger to the fisherman : for it will be readily conceded that if the herring fisher has now to employ vessels which in a storm are unable, owing to their size, to run into the Scottish ports, great loss of life may and does occur ; while it might not be out of place to enquire whether, with the same amount of appliances as were formerly employed, an equal amount of fish would be obtained in the present day. Along the east coast of Scotland the herring fisheries have increased in value, irrespective of Government encouragement, of legislation, or the suppression of all regulations, these being among the gregarious surface forms which arrive in such quantities that their annihilation would almost appear to be impossible. But, as I have already remarked, if you

drive away your fish you are rendering them, as food producers, more or less difficult for man to procure, and it was only last week that I received the prospectus of a new company which is being formed mainly for curing herrings, and in which it is announced as a well-known fact that boats have now to go to sea for distances varying from twenty to sixty miles before shooting their nets, entailing great loss of time in sailing to and from the fishing ground, irrespective of interruptions caused by storms and calms; while should boats, on returning with their fish, be becalmed, their cargoes become more or less spoiled, and often have to be thrown overboard or used for manure. From these causes sailing vessels are computed to now fish about three nights a week, whereas, were the shoals nearer in shore, as was formerly the case, they could shoot their nets more frequently and land their cargoes in a fresher condition. I cannot in this place fully enter into how it has come to pass that herrings are no longer found along the shores of Scotland, as they were twenty years since, but it seems probable that as garvie or sprat fishing commenced in increased force about 1868, at which period restrictions on the size of the mesh of nets was abolished, and during which fishings many herrings are likewise taken in enormous numbers, that this new industry, conjoined with freedom to net the herring shoals, ostensibly for bait, prior to the regular season, the fish have taken to localities farther away from

man. Here they now breed, and here a deep-sea race may be developed. Be this as it may, the consequence is that fishing boats have to be larger and go further out to sea to find the shoals; while, should storms occur, they cannot run into the neighbouring ports, and the loss of life is considerable. I find, in examining the returns of the herring fishery, that taking the annual proportion of fishermen to barrels of herrings, in Scotland from 1825 to 1849 it averaged about nine to one man; from 1849 to 1871 the proportion rose to fifteen to one man; and from 1871 to 1881 it became twenty barrels to one man. On the other hand, about 1856 cotton nets superseded hemp, and each boat has increased its power five-fold, so that were the captures on a similar scale to what they were previously, instead of the average being twenty barrels to the man it should be forty or fifty. Irrespective of scaring away these herrings, it must not be overlooked that in doing so the fish which feed upon them directly or indirectly, likewise go further away as they follow the shoals, and so sending your herrings longer distances to sea compels your line fishermen to work further from shore, not only increasing the price of the article, but to a great extent removing the calling from the possibility of being followed by the old fishermen. Mr. De Caux, of Yarmouth, commenting upon the alteration in the fisheries of the East coast since regulations were abolished, says, "if those views were correct, how is it that trawl

fish, especially soles and plaice, have, comparatively speaking, become so scarce; that the mackerel fishery of our Eastern coast has been all but annihilated, and that, whilst during the last twenty years the killing powers of drifters in the same district has been increased at least six-fold, the quantities of herrings captured has increased but slightly, if at all?" I think that those among us who have watched the rise and progress of the Great International Fisheries Exhibition, must have observed doubts to be arising in the public mind as to whether our sea fisheries are in a satisfactory state. They begin to ask if they have not been misled by theories pleasant to the ear, but unsatisfying to the hungry poor. And may we not enquire, Where are our oysters and our mussels? our lobsters and our crabs? Are our plaice and our soles becoming more common and cheaper, or is their size diminishing and their cost augmenting? Schools of cookery have demonstrated how inferior sorts of fish can be made into wholesome and savoury dishes, but would it not be more satisfactory were our fisheries continuing in that condition that there would be no necessity to send inferior classes of fish into our markets? Perhaps the true answer to the question, Why is fish so dear? may be found in the action of the Legislature in abolishing our fishery laws but taking no steps to maintain the supply of fish in the sea. Fishery Commissioners from all parts of the globe

adverted, at the Fisheries Exhibition, to the error we are committing in leaving this industry to chance, and our permitting the finny population to be taken in any way the captor pleases, regardless of their age, unmindful of their condition. It is, however, a good sign that H.R.H. the Prince of Wales has announced the early formation of a National Fisheries Society, holding the same position to fisheries that the Royal Agricultural Society does to Agriculture. And as local and representative Boards of Conservators have effected much good for inland fisheries, it is to be hoped that somewhat similar ones will be created in order to watch over the manner in which our sea and estuary fisheries are conducted. Property is said to have its responsibilities as well as its rights. We claim the fishes in our territorial waters as national property, but do we realise how we ought to turn that trust to the most profitable account, in order to supply the wants of the people? Continue the present wasteful plan of sea fishing, refuse to work them on more economic principles, and sea fish, instead of becoming cheaper, will probably annually increase in price.

At the close of the meeting a hearty vote of thanks was accorded Mr. Day for his valuable paper.

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