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PAPERS OF THE CONFERENCES

Held in connection with

The GREAT INTERNATIONAL FISHERIES EXHIBITION

FISH AS FOOD

BY

SIR HENRY THOMPSON

LONDON
WILLIAM CLOWES AND SONS, LIMITED
INTERNATIONAL FISHERIES EXHIBITION
AND 13 CHARING CROSS, S.W.

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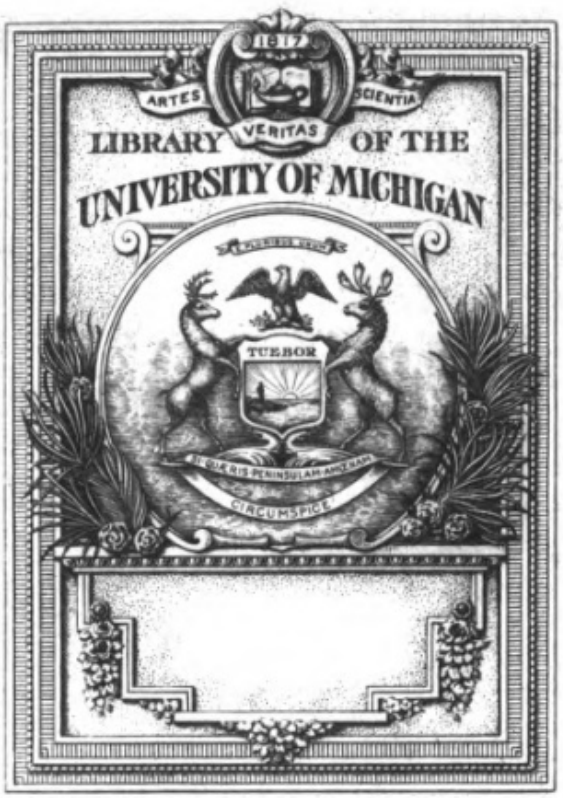

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International Fisheries Exhibition

LONDON, 1883

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BY

SIR HENRY THOMPSON, F.R.C.S.

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International Fisheries Exhibition.

LONDON, 1883.

Exchange
U.S. Fish Comm.
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CONFERENCE ON TUESDAY, JULY 17, 1883.

SIR PHILIP CUNLIFFE-OWEN, K.C.M.G., C.B., C.I.E., in the Chair.

The CHAIRMAN, in introducing Sir Henry Thompson, said he felt it a special privilege to take the chair on that occasion. They all knew Sir Henry Thompson as one of the most eminent surgeons in the world, but it was perhaps not quite so well known that he took very great interest in all subjects that were for the benefit and welfare of the human race. He was not sure whether the information they were about to receive, would not enable them to dispense to a certain extent with the services of the physician, but he was quite certain that the important questions relating to the use of fish as food would be dealt with in such a manner as could not fail to be of the utmost benefit to them all.

12-14-37

FISH AS FOOD.

I confess that it is with a deep sense of its importance, that I enter upon the discussion of the subject which is to occupy us to-day. The brief terms which designate it, present to our consideration questions of the highest interest to the entire population of this country, every inhabitant of which now lives within easy distance of a seashore; an interest indeed, which thus equally affects

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a large proportion of the human race in various parts of the world.

Fish as Food! Is not the fact thus tersely denoted, the essential and practical expression of the entire organisation which this great Exhibition presents? True, there are other modes of utilising fish besides that universal one of eating it; of which manifold illustrations may be seen here. But these exceptional uses are comparatively so insignificant, that the fact that fish is food for man must be accepted as the chief motive for bringing together this comprehensive collection of all matters pertaining to the natural history, the culture, and the various systems of capturing and preserving fish, contributed from every quarter of the globe.

It is our business here to-day to ascertain, so far as available data enable us to do so, what are the nutritive qualities which fish possesses, rendering it serviceable to the consumer; and how far these qualities can be best utilised by art. Further, inasmuch as the appropriateness of food for every individual is determined chiefly by its corresponding with the demand which his habits of life and occupation entail, and which vary so greatly in every population, an attempt will be made to indicate in general terms, under what circumstances fish appears to be most desirable to select as a chief article of diet.

I shall first endeavour to appreciate the value of fish generally as a source to the human body, of nutritive material, by comparing it with that which is supplied by other well-known forms of food. Then the leading characteristics of some different kinds of fish more or less available for the inhabitants of Great Britain will be considered.

And, lastly, some hints will be presented in relation to

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the economic uses and to the cooking of fish, and to the art of combining other materials with it, in order to supplement its natural deficiency in certain constituents necessary to render it a complete and acceptable food.

Most persons who have not acquired the rudiments of that most useful and interesting branch of learning, which treats of the structure and functions of the human body, are surprised to learn that from two-thirds to three-quarters of it, judging by weight, consist of water ; and this proportion is the same, or nearly so, in all the land animals which are consumed by man for his own support.

Thus in every hundred pounds weight of healthy flesh, not artificially fattened, whether beef, mutton, or poultry, and from which the bone has been removed, about seventy-five to seventy-eight pounds of water are present, and are separated as such from the solid matter of the meat in the processes of cooking and digestion. Twenty-five pounds or a little less, that is to say, not quite a fourth of the whole, alone are solid, and alone contain nutritive material. Speaking roughly, these twenty-five pounds are constituted as follows :—

About sixteen or seventeen pounds consist of the essential elements of the flesh or muscle, and of the solid part of the blood, which afford the important nitrogenous constituents of food ; the "albuminoid," or "flesh-formers," but not including another nitrogenous compound known as "gelatine," which is a type of the next group.

Of this gelatine, with some allied compounds, about one to two pounds are present ; but although nitrogenous compounds, they are distinct from the preceding class of flesh formers, and possess much less nutritive value as food.

Of fatty matters, about two to four pounds may be reckoned.

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The remainder consists of what are known as "extractives," and of various saline and even metallic matters, all of which are essential parts of the animal body.

It is necessary to observe that when meat is unduly fattened, as very often happens, the above proportions are greatly altered. When the meat is fat pork, for example, reared for bacon making, &c., or beef which is fed in order to secure a prize for size and weight, the products are wholly different, containing largely fat, with less albumen and fibrin, and but little water; and the pig owes his existence in great measure to the facility with which he produces fat meat for human food, such fat being of special value to use in combination with other foods which contain almost none of it.

Now let us compare with these animal foods one or two chief products of the vegetable kingdom; and as a typical example, because familiar to us all, and extensively used, fresh wheaten bread. In one hundred parts of this forty are water, fifty are starch, about eight consist of the nitrogenous principle corresponding to the albuminoid or flesh-forming elements in flesh, and there is but a fraction of fatty matter, the remainder being salts, &c. Fat, as you see, is almost absent in wheat; there is rather more of it in oats; still more in Indian corn. There is almost none in the potato, about three parts out of four of which are water: the solids consisting mainly of starch, associated with only about two per cent. of the flesh-forming principle. On the other hand, leguminous seeds, as peas, beans, and lentils, contain the flesh-forming principle in even larger proportion than that which is present in wheat, and also in animal food generally, but with very little fat.

With these broad general statements, put into the simplest form so that we may keep them in view without

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effort for a short time, let us now see what is the composition of fish. There is a closer resemblance, at first sight, perhaps, than many persons would expect to find. Notwithstanding that the fish is an inhabitant of water, and cannot live out of it, the proportion of that element in the animal's structure exceeds only by a small amount the proportion which is present in land animals. In other words, the solid constituents of fish as a class, and there are important exceptions here and there, are but little less in weight, than those which the flesh of cattle contains, and which are already before you.

In one hundred pounds of fish without bone, from seventy-five to eighty-five are water, or rather more than three-quarters of the whole; leaving, say, about twenty pounds of solids as a mean estimate. Of these, about twelve to eighteen pounds are nitrogenous compounds. The most important, or flesh-forming principle, is less in quantity than in meat, and there is a rather larger proportion of gelatine; they are placed in one group here, for further analyses of fish are required before accurate quantitative results are forthcoming in relation to this question.

The fat in fish varies in quantity greatly, somewhat according to the condition of the fish and season, but mainly with the different species. It is less than one pound in the hundred in sole, whiting, and haddock; much the same in turbot, brill, cod (without liver), and dory. It is a little more in the plaice, and rises to seven pounds in the hundred in the herring, to twelve or more in the salmon, fifteen or sixteen in the mackerel, and even to thirty in the eel.* In all these it is dispersed throughout

* I am indebted for these amounts to the recent researches of Dr. J. Kœnig, kindly forwarded to me by Professor Church, author of the excellent South Kensington handbook on "Food."

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the body. But some fish have it largely stored in the liver, as in the cod, skate, red mullet, &c. And of course where much fat is present, the amount of water is diminished in a corresponding ratio.

The various saline, and other matters remaining, vary between one and two pounds in the hundred.

ANALYSIS in GENERAL TERMS of the COMPOSITION of the FLESH of a HEALTHY ANIMAL, not ARTIFICIALLY FATTENED, and OMITTING the BONES.

In 100 parts.

About	75 to 78	are water.
Leaving . . .	22 „ 25	of solids.

Of these solids—

About	16 or 17	are albuminoids or flesh-forming material . .	Nitrogenous compounds.
„	1 to 2	„ gelatine . .	
„	2 „ 4	„ fat.	

Remainder—"Extractives" and salts.

ANALYSIS of WHEATEN BREAD.

In 100 parts.

About	40 are water.
„	50 „ starch.
„	8 „ albuminoids.

Remainder—A trace of fat with salts.

ANALYSIS of WHITE FISH WITHOUT BONE (SOLE, WHITING, TURBOT, &C.).

In 100 parts.

About	75 to 85	are water.
„	20	„ solids.

Of these solids—

About	12 to 18	are partly albuminoids, with a rather large proportion of gelatine	Nitrogenous compounds.

Remainder—A little fat with salts.

In some fish where the fat is large in quantity (herring, mackerel, salmon, &c.), the water is correspondingly diminished.

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Comparing the foregoing tables with each other, we may arrive at an approximate estimate of the place which fish occupies as nutrient material among the other products which the animal kingdom offers to man. Let me first say that our estimate has thus far been based solely on the facts afforded by a chemical analysis (without reference to other considerations of minor importance)* of three

* I think it must be admitted that while as a general rule, the nutritive value of food is to be determined by the presence in it of certain chemical elements, harmoniously adjusted to the composition of the body to be nourished, yet there are some restorative qualities contained in animal flesh, which, although not at present fully appreciated by chemical analysis, have a value of no mean order, demonstrative chiefly by empirical observation. The invigorating effect of a small quantity of beef-tea, in a person suffering from inanition, may be cited in illustration ; the solid matter resulting from its evaporation being insignificant in quantity when compared with the support afforded. Now the product obtained by dealing with fish, in the same manner as we treat beef in order to obtain "beef-tea," is greatly inferior in this restorative quality, although the solids present are larger in quantity in "fish-tea" than in that of meat.

I have had the following experiments performed in the most accurate manner, which will show in part the nature of the chemical difference.

One pound of rumpsteak, one pound of turbot, each without skin and bone, the former freed from fat, were thus separately treated. The flesh was passed twice through a sausage-machine, and sufficient cold water to cover (one pint) was added. After standing one hour, the mass was heated to boiling point, and allowed to simmer ten minutes, then strained through calico, and the contents of the strainer washed with water : a little floating fat was removed (in the case of the beef.) Each of the liquids was evaporated on a water bath to the consistence of a soft extract.

Beef-product.

Weight of extract, 276 grains or 3·94 per cent.
In this product 5 per cent. of gelatine was present.

Fish-product.

Weight of extract, 396 grains or 5·6 per cent.
In this product the gelatine amounted to 21·8 per cent.

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typical kinds of food, viz., meat, wheaten bread, and fish. Possessing this, the fitness for man's use of any food is estimated by the presence of those elements which his body requires for its renovation, to sustain its temperature, and to supply force for labour; and presented in a form which the body can readily assimilate. But we must bear in mind a subject already just alluded to, that the several elements of food which have been named are required by different individuals in very different proportions, which vary according to the daily occupations which such individuals pursue.

It has fallen to my lot, in the exercise of daily duty for many years past, to observe and to study the views and habits of my countrymen in relation to their diet, and it is impossible not to remark the want of intelligent thought bestowed by people generally on the subject of food, although it is one of which it is scarcely possible to overrate the importance. Thus that large and actively engaged portion of society, designated usually by the term "middle-class," appear for the most part to adopt an almost uniform dietary, the constituents of which, and the method of serving them, vary little from a certain regulation pattern; and each person accepts and conforms to it for the most part without thought or enquiry as to its fitness for him. The pattern adopted by the working man, more restricted in kind, is followed in the same unvarying fashion. And in very few instances, even among the best educated persons, can it be said that the individual exercises much discrimination in respect of those external influences affecting the body and conditions of it, which demand selection of food and variety in its character to meet the circumstances of his own particular case.

I shall name three important factors, always to be regarded in connection with the selection of our food, the

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bearing of which on the subject of a fish dietary will appear.

The first is the effect of hard labour involving considerable muscular exertion.

The second is the influence of climate or of temperature on the body.

The third is the influence of age.

In relation to the effect of continued muscular exertion, it must be manifest that the porter, the navvy, the labouring mechanic, the agricultural labourer, and the marching soldier, require food in quantity and kind, differing widely from that which the sedentary man of letters and the counting-house clerk demand; marked and contrasted types which we may refer to hereafter, and between which innumerable modifications of condition exist.

For the purpose of sustaining severe and continued muscular exercise, the diet must contain a good proportion of fatty matters, and of starchy matters; also a moderate amount of albuminoid or flesh-forming elements, together with earthy and other salts of course. All but one of these are present in the flesh of animals, the missing element, starch, being supplied by adding bread, potatoes, rice, &c., a practice which has been empirically followed for ages, long before the physiological reason was known. Many cereal grains, wheat, oats, &c., and also peas and beans, contain both flesh-forming material and starch; hence bread has been termed, not quite correctly, but nearly so, the "staff of life." All these are deficient in fatty matters, which are necessary to the working-man, who adds butter, bacon, suet, lard, or oil (in other countries), in order to supply his expenditure. No hard labour can be achieved without the consumption of a considerable amount of fatty substance. For our labourers then, all

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ordinary fish (some notable exceptions having been named) is deficient in fat, and does not contain a large proportion of the flesh-forming albuminoid. He cannot live on fish alone, but he may add starch in the form of potato or rice, better still bread, and fat, as bacon or lard. I can scarcely give you a more apposite and interesting illustration of this than the following:—On the southern coasts of England, notably in Cornwall and Devonshire, the fishing population, who work very hard, and require therefore an appropriate diet, deal with their fish in the following manner, and it forms the staple of their nourishment for a large part of the year. Portions of any fresh fish are cut up and placed in a large pie dish, among them some thick morsels of fat pork, with salt and pepper; the whole is covered with a substantial crust, and baked. Mark how all the elements necessary to the man who toils hard are combined, and in perfect proportions to his needs. A moderate amount of nitrogenous matter appears in the fish, and also in the flour of the crust, which latter also contains the necessary starch; the fatty matters deficient in fish are furnished by the bacon, and also by the lard with which the crust is made, while the necessary salts appear in each of the constituents named.

It has been said by some persons, as I am informed, that the fish dinners supplied at the Exhibition, although plentiful in quantity, do not afford support for any length of time, and that the desire for food soon returns. Of course that must be so in the case of those who lead an active life from morning to night; a fish dinner may be desirable now and then for persons so employed, but something more than fish is requisite to sustain the laborious exercises demanded of them. Suppose that a plate of fish and some bread have been eaten, a small

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plate to follow, say, of bacon and beans, of suet pudding or sausage roll, or of a fruit tart with substantial crust, will at once supply the elements which an ordinary dish of fish fails to offer; while a pleasant sense of satisfaction will follow, and no complaint of void will be heard until the accustomed period of time has elapsed.

On the other hand, for those whose physical labour is light, other products of a less substantial kind may furnish the indispensable adjunct; and thus we become acquainted with the fact that the very sauces which long usage has decreed shall accompany fish at our tables, consist precisely of those materials which science has proved to be essential in order to render the dish not merely acceptable to the palate, but a perfect and harmonious combination of the very elements which man requires for all the purposes of life. The Hollandaise sauce, the Mayonnaise, the melted butter, with their innumerable variations, all composed more or less of olive oil, yolk of egg and butter, afford the exact complementary material in which the fish is naturally deficient.

I cannot help adverting to the curious fact, which I have no doubt arises from the physiological law I have been illustrating, that at a Greenwich fish dinner from time immemorial, however profuse and varied the service of fish has been, at the end of it appears a fat ham or a handsome piece of Hampshire bacon, surrounded by broad beans. Clearly the dish is not really wanted in such luxurious circumstances, but it is beyond doubt a survival of the practice founded on a natural want, and discovered empirically; and the bacon makes its appearance because experience had ages ago taught mankind that after fish or with fish a portion of fat is demanded.

There is no doubt that the obvious and admitted value

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of a highly nitrogenous food, of which meat is a concentrated form, to the labouring man, has occasioned the almost universal belief that such meat, of which let beef and mutton be the type, is the most desirable food staple for all. "If you wish to be strong, eat plenty of meat;" "If you are feeling weak, eat more meat, and at every meal;" such are the well-known articles of a creed which is deeply graven in the popular mind. Nevertheless few statements relating to diet can be more misleading, and few are, in my opinion, productive of more evil to the community.

It is this habit of adopting meat as the chief element of his dietary, which the sedentary man, with little opportunity for bodily exercise, the man who uses his brain more than his muscles, should especially avoid. Equally also should he abstain from fatty matters in large quantity, taking only a moderate proportion, which is not only permissible, but necessary to that extent. For if he habitually consumes these two classes of food freely, materials are introduced into the system which it cannot eliminate, and which must ultimately obstruct the function of some internal organ. Thus the periodical bilious attack, or the recurring fit of gout, or some other relentless tormentor, clears the system for a time of the offending matter which the daily error in diet is perpetually reproducing and accumulating. Those who are thus affected often endeavour to ward off their troubles by systematic muscular exercises, fencing, rowing, and the like, and they do so with a certain amount of success. It is for the purpose of getting rid of superfluous nutritive materials that others (who may be wholly unconscious of the need which impels them) secure their yearly shootings, make Alpine excursions, or seek the mineral springs of a foreign spa.

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contrivances, all of them, for effecting the required elimination once or twice a year by a method more or less agreeable, but which would not be necessary had food suitable to a sedentary life only been taken. Many a man might indeed safely pursue a sedentary career, taking only a small amount of exercise, and yet maintain an excellent standard of health, if only he were careful that the "intake" in the form of diet corresponds with the expenditure which his occupations, mental and physical, demand. Let him by all means enjoy his annual pastime, and profit by it, to rest his mind and augment his natural forces, but not for the mere purpose of neutralising the evil effects of habitual dietetic wrong doing.

It is for this large and increasing class of the community, who are emphatically brain-workers, that fish furnishes an appropriate food; and when we reflect that the tendency of civilisation here and elsewhere is slowly but surely to develope mental activity, and to dispense with laborious handicraft, that all advance in individual as well as corporate well being is commensurate with, and indeed is effected by the substitution of brain-work for mechanical labour, we may see in this great and systematic investigation of the world's fish supply, a notable sign of the times. I regard it as a natural and necessary product of an advancing civilisation, as the inevitable result of the age and its needs, and certain to have been evolved thereby sooner or later.

A form of food which exists in unimaginable profusion on our own shores; one which has been hitherto for the most part but an agreeable appendage to the daily table of a few, ought I think to be more generally recognised as peculiarly adapted to the wants of a very large, influential, and increasing part of our population.

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For the sedentary man, whatever his calling in life, whose engagements permit him only to take just that moderate amount of muscular exercise which is in all circumstances essential to health ; for a great proportion of women whose habits mostly are not, and often cannot be active, the nutritive elements afforded by fish admirably supply an important part of the wants of the body. The moderate amount of flesh-forming material present in fish, and in a form which entails little labour on the digestive organs—for most persons certainly less than meat—and the facility with which fish may be associated with other elements—fatty matters, or cereal and vegetable products—place it in the first rank of foods in that mixed dietary which is suitable to those who lead more or less the kind of life referred to. I by no means say that it should supersede the use of meat altogether, although it may do so sometimes with advantage; a point only to be determined in each individual instance after some observation and experiment. For in all cases, it is to be remembered that no man who has habitually eaten meat two or three times daily can at once exchange it for fish and cereals or vegetables, without some discomfort, to say the least. All radical changes in diet require to be gradually made : the stomach conforms slowly, when long accustomed to deal with highly nitrogenised animal food, to the task of deriving from different materials the support necessary to the body. Given time for such modification of function, and it is remarkable—at least it appears so to those who have not practically studied the subject—that a diet which, if adopted suddenly might be equivalent to semi-starvation, may by degrees become the most healthful and nutritious which the individual can adopt.

I may here advert to a belief which appears to be very

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widely entertained, viz., that fish contains certain elements which adapt it in an especial manner to renovate the brain, and so to support mental labour. There is no foundation whatever for this view: the value of fish to the brain-worker is due simply to the facts already referred to, viz., that it contains, in smaller proportion than meat, those materials which taken abundantly demand much physical labour for their complete consumption, and which without this, produce an unhealthy condition of body, more or less incompatible with the easy and active exercise of the functions of the brain.

I must merely advert very briefly to the subject of climate and temperature, as bearing on the question of fish as an article of diet. Time will permit only the remark that the greater the exposure to cold, the larger must be the amount of fatty matters contained in the diet; hence the large use of fish oils by the inhabitants of the arctic shores. While in hotter climates than our own, as among the populations occupying much of the Mediterranean coasts, a little fish suffices in addition to cereals, vegetables and fruit, together with olive oil, to supply an amply sufficient dietary.

The question of age in relation to food, respecting which a volume would be necessary for the adequate consideration, must also be rapidly glanced at here. During the period of early growth, the supply of food both in nature and in quantity must be selected to correspond to the demand. During the period of middle life, that of maximum activity of all the functions, the nature and amount, as already intimated, of that activity must govern the selection of our dietary on principles which have already been explained. Then inevitably comes with advancing years the stage of

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diminished force, diminished activity, and the love of rest and quiet. The popular belief holds with curious tenacity, that the failing power of age demands increased sustenance by food. This erroneous doctrine ignores the important fact that sometimes the digestive powers, but more generally and obviously still, the ability to eliminate food unnecessarily consumed, are notably diminishing. Hence the appearance of a crowd of chronic troubles peculiar to the latter third of life, and to a great extent avoidable. So far from continuing to select the strong nourishment which may have been necessary during the toil and anxieties of thirty years or more of adult energy and activity throughout the prime of life; the elderly man who desires to preserve fair health and to attain to longevity, should gradually diminish his use of strong nitrogenous and much fatty food. He should substitute a lighter dietary; one in which the best forms of fish may suitably hold a conspicuous place. He subsides naturally, and more or less gradually into the class of the sedentary, and adopts the regimen best adapted thereto.

We have now to consider what are the different kinds of fish which are available as food on or near to the British shores; and what are the leading characteristics of some of the chief varieties.

I may remark that the list of fish in general demand by the public is a restricted one. The force of habit, together with the entire absence of inquiry or curiosity on the part of our countrymen in relation to diet, has led to a conventional usage, limiting greatly and disadvantageously the variety of fish which would otherwise arrive at the market Sole, whiting, mackerel, cod, salmon, turbot, trout, smelt, and red mullet, form a group to which a large proportion of British households in purchasing fresh fish as a rule

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strictly limit their orders. Again, at almost every hotel, coffee-room, or public restaurant here, and whatever the hour of day, it is rare indeed if the waiter summoned to an applicant demanding fish does not first suggest the inevitable fried sole, whatever else he may have to offer; and it is generally accepted as probably the safest order to give, and the most likely to be promptly executed. No desire for variety in material, or in cookery is manifested, for if the host suggested something less familiarly known, a troublesome doubt as to his motive would probably be aroused in the mind of the guest.*

To return to the list of fish just given, it may be remarked that the sole, the whiting and the smelt are the most delicate in flavour, contain the least nutritious matter, and are the easiest of digestion; fitting them admirably to the invalid commencing after illness to make a trial of solid food; the two former being also susceptible of very varied treatment in high class cooking for the production of elegant entrées. The turbot, rightly esteemed, is stronger food and agrees well with most persons. The cod for some is not quite so readily taken; but is not only more palatable but is sometimes more easily assimilated when "crimped." The same may be said of the salmon, a leading characteristic of which is the presence of fat. This element in fish is more apt to disagree with the stomach than fat from other sources; and on this account it is, that many either avoid, or eat sparingly of salmon. As the

* Since writing the above, I have learned that in the fish restaurant here, a similar experience has been met with. Notwithstanding the efforts of the accomplished lady superintendent to introduce to the public new modes of cooking fish, curries, stews, &c., she informs me that these have been entirely neglected, and among the thousand or more daily visitors, three-fourths demand fried fish, and the other fourth take it boiled, or rather steamed.

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fat is chiefly found in the underside of the fish, a slice from the back only should be taken by such persons; and in the fresh crimped fish the fat is in a more wholesome state than when on the second or third day after leaving the water it becomes oily and acquires a slight characteristic taste and odour.

One word about the crimping of fish; I am glad to be able to state not only that the process of crimping does not require the animal to be alive, for its proper performance, as some have stated, but that as a matter of fact the operation is not done on the living fish. Were I not satisfied on this head, I would not give any countenance to the practice.

The mackerel is another oily fish, and it disagrees with some persons accordingly; so is the red mullet, but the oil is chiefly in the liver, and gives the fish its peculiar flavour and value.

The second list of fish I shall call your attention to is headed by the Dory, an admirable fish with a peculiar firm, short, flakey and very white flesh, belonging to the first rank in all respects, and not sufficiently appreciated. The brill, the grey mullet, the haddock, the fresh herring and the flounder follow, all excellent food, and wanting only proper treatment in the kitchen to make them very palatable, of which a hint or two presently. Then the herring, the pilchard and smaller varieties of the family, by reason of their abundance, the facility with which they are preserved, and of the fat which they contain, furnish large supplies of useful food not only here but to other European populations. Next in order the skate and the plaice, of which the same may be said; while their price also brings them, or should do so, within the range of the working man; in nutritive qualities they rank much higher than the sole and whiting.

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But besides all these there are fish, which may be placed if not in the first, yet certainly in the second class, which are practically unknown, I will say, to ninety-nine out of every hundred London housekeepers. I shall name first the Wolf-fish, or Cat-fish, which, although unlike in appearance to the usual occupants of a fishmonger's shop, is a white fish, of excellent quality. It lives almost entirely on crustacea, a circumstance, as Yarrell long ago pointed out, always associated with excellence in the fish so fed. The superiority of the cod caught at the Dogger Bank is partly due to the same cause, as their food at this spot is largely crustacean. The halibut, from the North Sea, closely related to the turbot, is good and substantial food, and when large, as it often is, is also very cheap. The sea-bream, not unlike a large freshwater perch, and the basse, which has been sometimes styled a white salmon, are both useful varieties which have never received the attention they deserve, and which may be presented simply yet effectively at table. The gurnard is much better known, and an excellent dish may be made with it. Among cheap fish, which might be obtained in any quantity and at a very small price, are the ling and hake, related closely to the cod, but chiefly used at present as salted fish and exported; the thornback, of the same family as the skate and equal in quality; the pollack, a substantial whiting, and the coal-fish, of the same family, but second in order of quality, are both good when in season; a proviso which, it is to be remembered, applies equally to every variety.

I shall but enumerate the conger—excellent for soup and stew making—the source, as few people seem to be aware, of all our turtle soup when at its best, the turtle furnishing only the garnish and the name; the whole tribe of eels

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with their abounding fatty constituents; and the sturgeon with a flesh approaching in quality nearer than any other fish to that of meat; besides all the fresh-water fish, such as pike, tench, perch, &c., of which the supply is, by comparison with sea fish, limited; following on which there is still a large number of minor fish which it would be tedious to particularise. I feel certain that the result of the interest and inquiry aroused by this Exhibition, together with the opening of new fish markets, will make us all more familiar with many yet untried and valuable products of our shores, and especially with the richer and better stores which populate the "deep sea," a region which may be regarded as lying between fifty and three hundred miles distant therefrom.

I shall now make a few general remarks on the practical treatment of fish in preparing it for the table. Our observations will commence at the point at which the fish leaves the fishmonger's scale, or if not weighed, has been valued to the purchaser, and has become his property. Before entering into his possession, however, it first undergoes the process technically known as "cleaning." This differs considerably according to the fish to be dealt with, but in all cases it involves the loss of what is often a valuable portion of nutritive matter. The gills, liver, intestines, &c. are first removed, often some skin, then portions of the fins, sometimes the head also. All these are known as "cuttings," and are sold at a low price to the poor, at the close of the day, many of whom, I am happy to say, appreciate their value and profit thereby.

To illustrate the result of this process for the purchaser, let us see what happens in one instance, as an example, no doubt an extreme one, but nevertheless occurring daily in every fishmonger's shop. A pair of soles is bought and

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ordered to be sent home in fillets: eight fillets accordingly arrive. The soles were first skinned, the internal parts taken out, after which a long fillet, consisting of all the flesh on either side of the central bone, both front and back, was removed, making four from each fish. The whole skeleton, with the head, fins and tail, forming an entire piece, remains as "cuttings" in the shop. Now this piece will be found just equal to the fillets in weight, and is in fact one half of the fish; and it will make excellent stock for soup, a form of food greatly neglected in this country. I have an illustration of this here, for the purpose of showing what a large amount of waste occurs not only at the purchase, but may also subsequently be incurred in the kitchen. For in utilising fish, as far as possible, and in circumstances where a strict economy must be regarded, the soft parts of almost any fish may be cooked apart, so that the skeleton, head and fins may be utilised for stock, these parts being of course useless for that purpose when already cooked, as by boiling, frying, &c.

A soup, or what is better a stew of fish, may be made in a very savoury and nutritious form for the working man; or it may be presented as a delicate and attractive dish for an experienced palate. It is not within the narrow limits of this Paper to furnish details for either product, but the subject well deserves to be practically studied, and especially in relation to the charitable soup-kitchen, where fish may thus prove of great value, as well as for other gastronomic purposes. I have recently had an opportunity of seeing the Department of Practical Cookery here, and can testify to the excellent work which has been carried out in the direction indicated. The less esteemed kinds of fish already referred to, when better markets and improved modes of distribution exist, will abundantly furnish the means of

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producing a nutritive dish at a very small cost, especially in the colder season of the year.

I shall, before closing this Paper, venture to offer a practical suggestion or two in reference to preparation of fish for the table, which, considering the terms of our subject, appear to me to be sufficiently important to be brought under your notice here, and to which your consideration may be fairly invited. I think it will be universally admitted that, according to the present usage adopted by the majority of consumers in this country, the bulk of our fish is cooked almost invariably by one of the three following methods :

First, it is simply boiled, in which case it is served with a liberal supply of some butter sauce, often associated with a minor fish product for the sake of flavour.

Secondly, the fish is fried either whole or in portions, and is eaten with or without butter sauce, or with the juice of a lemon, or that of the mushroom, or with some composite ready made sauce.

Thirdly, it is broiled, and is served pretty much as in the preceding mode ; but occasionally, and this relates to a few exceptional varieties, it is baked, and some form of seasoned forcemeat is served with it.

By all these methods, but particularly by boiling, some waste of nutritive material occurs. Relative to this I have made numerous experiments, and I find that the loss in weight by boiling varies with different fish, and also with the mode of operating. It is rarely as low as five per cent., it is generally much more, and I have known it to reach thirty per cent., the water always containing more or less solid animal matter. In order to avoid waste as much as possible, the fish should be placed in a relatively large quantity of water, which should be boiling.

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The liquor in which the fish has thus been cooked, I have evaporated, and have obtained from it, in solid deposit, no less than four per cent. of the original weight of the fish ; a very startling quantity. There is no doubt then that steaming is a more economical process than boiling, which in my opinion ought to be discarded altogether.

But I now desire to call your attention to another mode of cooking fish, which ought to be general, since it is applicable to all varieties, and has the advantage of retaining all the nutritive material, while the juices and the characteristic flavour of the fish are preserved in a manner not attained by any other process. It is very rarely practised, simply, I believe, because any other than stereotyped methods in cookery are always regarded with suspicion, and are very slowly adopted by the public, until attention has been thoroughly aroused on the subject. The opportunity offering a few years ago, I advocated its occasional use, but I wish now to show how widely it is applicable, and how well it deserves at least to rank among the other and better known modes of preparing fish. It consists in placing the fish, after the usual cleaning, entire, if of moderate size, say from a sole to a small turbot or dory, in a tin or plated copper dish adapted to the form and size of the fish, but a little deeper than the thickness of it, so as to retain all the juices, which by exposure to the heat will flow out ; the surface is to be lightly spread with butter, and a morsel or two added ; the dish is then to be placed in a Dutch or American oven, or with some other screen to reflect the rays of heat, in front of a clear fire.* The

* Mr. W. Burton of Oxford Street, has been good enough to send an oven or two, and some dishes, which he has made expressly for

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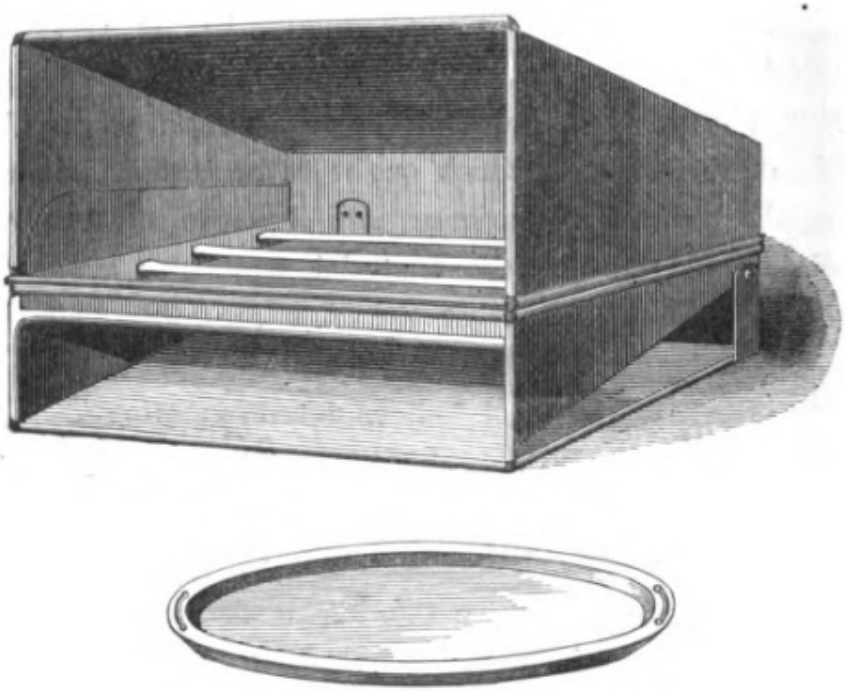
advantages of this method are, that the fish is cooked entirely in its own juices, which are abundant, and form the best sauce, and that these juices which contain part of the nutriment and much of the characteristic flavour



SKETCH OF OVEN ADAPTED FOR COOKING FISH BEFORE THE FIRE.

The size from which the above was taken is 18 inches in length; 16 inches high at the front or highest part. It is 13 inches deep from before backwards. There are four bars in the middle on which the dish containing the fish is placed. The dish seen below is intended for a small turbot, brill, or dory, and is about 17 inches long by 12 inches wide, including the rim, which is 1 inch wide, and is about 1½ to 1¾ inch deep. (Smaller sizes than the above are made.)

are saved and utilised; lastly the direct action of the fire browning the surface of the fish, gives that peculiar and

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me, suitable for cooking fish before the fire. The oven is a modification of that known as the "American," being rather deeper, from before backwards, and much shallower, from above downwards, on account of the flat form of fish not occupying the space which is required by joints of meat.

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appetising flavour which is the especial charm of the "roast" and the "grill," and which is known to appreciative palates as "tasting of the fire." In fact, the proper term for denoting the method described, is that of "roasting," for the fish is literally roasted before the fire, and basted in its own gravy; and with the same advantage in result as that which roasted meat possesses by universal consent over that which is baked in an oven.* When served at the table the fish remains of course on the dish in which the cooking has taken place. The method is susceptible of innumerable variations to accommodate different tastes. Portions of fish prepared as fillets may be treated as well as entire fish; garnishes of all kinds, as shell fish, &c., may be added, flavouring also with fine herbs and condiments, according to taste. I may add that the process may be conducted in an oven where a clear fire is really not to be had, which is then of course ordinary baking; but this dries the fish unduly; or the dish may be first placed in the oven, and be finished before the fire, which is better. Cooked, however, as first described, such a dish may be welcome at any table; in preparing red mullet, for example, it is inimitable, and far better than any other mode, for preserving their own rich gravy and admirable flavour. But the working man also can thus advantageously cook before his kitchen fire, in a common Dutch oven, some fillets of plaice or skate with a slice or two of bacon; the dish to be filled or garnished with some previously boiled haricots, and by this means

* Mr. Grove, of Charing Cross, to whose great practical knowledge of all matters relating to fish, especially in regard of its fitness for the table and of the art of presenting it there, I have long been indebted, advocates the method above described as the best for most kinds, and as worthy to take its place as a welcome variation, in turn with those processes of cooking which are more generally practised.

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secure an economical and savoury meal, which is in the highest degree nutritious. This is but a single illustration among many which might be adduced, of what may be done by this simple method for those whose resources are of the slenderest kind.

The limits of time allotted to this paper have now been reached. In bringing it to a close, I must confess how difficult I have found the task of treating so large a subject within so small a compass as that which has of necessity been assigned to it. No one can feel more keenly than myself how inadequate is this attempt to grapple with the several questions which naturally arise in considering the fitness of fish as food for man. Should a practical hint or two of any value have been furnished, or should fresh light on the subject be evoked thereby in discussion, I shall be well content to have had the privilege of offering a slender contribution towards the furtherance of an object, for the accomplishment of which are associated, in active and disinterested labours, so many of the noblest and of the most illustrious of our time.

DISCUSSION.

Dr. COBBOLD thought there was no necessity for the modest apology made by Sir Henry Thompson at the end of the Paper, for not being able to do full justice to the subject. In the short space of time allowed he had succeeded in giving an immense amount of useful information, but as he himself had pointed out there were some phases of the subject with which it was impossible to deal, such as the danger of eating fish on account of the organisms to be found in some of them. There had been no less than a dozen small parasites in fish described as trichines and

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people had been unnecessarily alarmed at the danger of getting trichinosis, but the fact was that these so-called trichines were the immature forms of a higher parasite well known to them, and persons might swallow any quantity of them without any evil effects. In the Basque provinces they actually collected the small vivaria under the impression that they were really small fish and ate them with deliberation and relish; and in Italy the "maccaroni prati" was considered a most toothsome dish. The important question was whether there were any parasites in the human frame arising from eating fish, and to that question the answer must be given that it was possible to contract an important and injurious parasite by eating some of the salmonidæ in an uncooked state, because it had been shown that we must look to the salmon and trout family as the source of the great tape worm. There was, however, very little ground of alarm; all they need do was to be sure that the fish, in cooking, was raised to a temperature of 120 degrees, when the parasites would be destroyed however numerous they might be. He might further add by way of encouragement to those who still had their fears, that every kind of parasite had its particular territory and if it were possible to swallow a thousand different species, no harm could possibly result, unless they happened to swallow the particular one that could live in the human territory. Needless alarms had been spread on that point which he hoped would shortly be allayed.

Mr. KENNETH CORNISH said he agreed with Dr. Cobbold that there was no danger—or very little—to be apprehended from the presence of parasites in fish, but he thought some caution ought to be exercised to prevent danger from poisoning. His namesake, who read a Paper on the previous Friday, had alluded to the poison present

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in green mackerel, and in the West Indies poisoning among the negroes was exceedingly common from eating the barracouta and yellow bill sprat. The only thing which seemed entirely to destroy these poisonous effects was thoroughly drying and salting the fish.

Mr. WILMOT (Canadian Commissioner), said he had listened with much attention to Dr. Cobbold's remarks, but he was of opinion that the parasites referred to were in the fish at a time when they might be called foul or unclean, or unfit for human food—at any rate they predominated in them during that period. If they were only to consider that there was a time for eating fish, as there was for any other food, when it was in a proper condition they need not be alarmed at these parasites, but unfortunately large quantities of fish were caught in an unfit condition, their abdomens distended with the ova. Was it not a fact that they had laws forbidding the killing of salmon in that state; and no farmer would be allowed to bring into the market a beast that was far advanced in pregnancy. Fish were out of sight, and therefore to a certain extent, out of mind, but they laboured under the same difficulties as the domestic animals, and it was the duty of man to protect them during the breeding season.

Professor BROWN GOODE (United States Commissioner), in moving a vote of thanks to Sir Henry Thompson, said he considered the Paper was the most important that had been presented. Many of the other papers had been of great interest to certain localities, but this was of great importance to every part of the world, and he hoped it would be translated into many languages. He was sure that his own countrymen would read the paper with much interest. It had been suggested that there were many fish in the English waters which were not properly appreciated, and

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he might mention that in New York they had a society called the Ichthyophagus Club consisting of intelligent and philanthropic gentlemen who met together once a year to dine upon fish and it was customary to have new kinds of fish brought forward and cooked by the best cooks. Through the agency of that organisation quite a number of valuable fish had been introduced to the knowledge of the public at large, and the influence upon the fish trade of the United States had been very considerable, and he thought something of the kind might be useful in other countries.

Mr. ALFRED JARDINE seconded the vote of thanks, which was put and carried unanimously.

Sir HENRY THOMPSON, in reply, said he should have very little to say because the discussion had not been such as to require further remarks from him. Professor Cobbold was the highest authority in this country on the subject of all parasites affecting the human body, and he was only too happy to learn from him how little they had to fear on that point in eating fish. He desired to repeat, lest he should have been misunderstood, that he was not an advocate for an exclusively fish diet for any one. Nor did he think that it was wise to limit our resources, in choosing our food, to the products of either the vegetable or the animal kingdom alone. The whole of these should be at our disposal, and it was for man to decide for himself what form of diet was most suitable. The wants and the circumstances of the human race are so varied, and individual constitutions so widely different, that dogmatism in the matter of diet was, in his opinion, a mistake. Thus, two persons might sit down and eat exactly the same meal and the one would derive a great amount of nourishment from it and the other scarcely any. But relative to the particular

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topic of to-day, he would venture to suggest that most people who did not take a great amount of exercise would, as a rule, act wisely by eating less meat and more fish. In conclusion he moved a vote of thanks to the Chairman, which was carried unanimously.

The CHAIRMAN, in response, said he was grateful for the way in which the motion had been received. When they considered that in a few days the important paper to which they had listened would be published and issued throughout the world they would see what an immense amount of good would ensue.

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