

such fishes as the mackerel and herring with the shimmering produced by light transmitted through a water surface broken by waves.

Many of the photographs of the eggs and young stages of fishes are very well done; we may direct particular attention to the series representing the hatching of the salmon egg, on p. 50; those illustrating the early stages of the roach on pp. 104-5, and the series taken at Port Erin Hatchery, which represents the larval metamorphosis of the plaice. All these are probably better than any hitherto published.

The defects of the book are in the text, which is sketchy and slight, and is not free from errors. The author evidently confuses the eel and lamprey on p. 126, for he speaks of the former fish as possessing several gill openings behind the pectoral fins. Haddocks (p. 129) are said generally to feed on herring eggs—certainly an exceptional habit. Skates, rays,

State to science, and in the relations between the spheres of government and of knowledge.

France recognises clearly the fact that a nation depends on its science; that its commerce, its industries, its education, all its sources of wealth and of character, are to be found alone in a living and growing material of experimental knowledge. And the nation translates this recognition into will.

In the *Revue Scientifique* of September 23 there is an article by M. A. de Foville, permanent secretary of the French Academy of Moral and Political Sciences, which may well stir envy in an English mind, and prove once more that they manage these things so much better in France. M. de Foville gives a sketch of the Government department known as the "Caisse des recherches scientifiques," which was instituted in 1901, and now celebrates its decennial anniversary merely by modestly directing the attention of capitalists

to its existence. The Caisse owes its institution to M. Audiffred, now a member of the Senate; its object, to quote his words, is "to endow all the sciences with adequate means; to ensure that no serious investigator shall be hindered in his work by lack of the funds necessary for research." It is attached to the Ministry of Public Instruction, but is actually autonomous. It is not, as M. de Foville observes, a charitable institution, but a State Treasury for scientific research. It has a very strong technical committee, which decides upon the applications sent in, and sends its recommendations to the administrative committee. The latest volume of specifications and results of researches financed by the Caisse contains 800 pages. The researches financed or assisted hitherto are

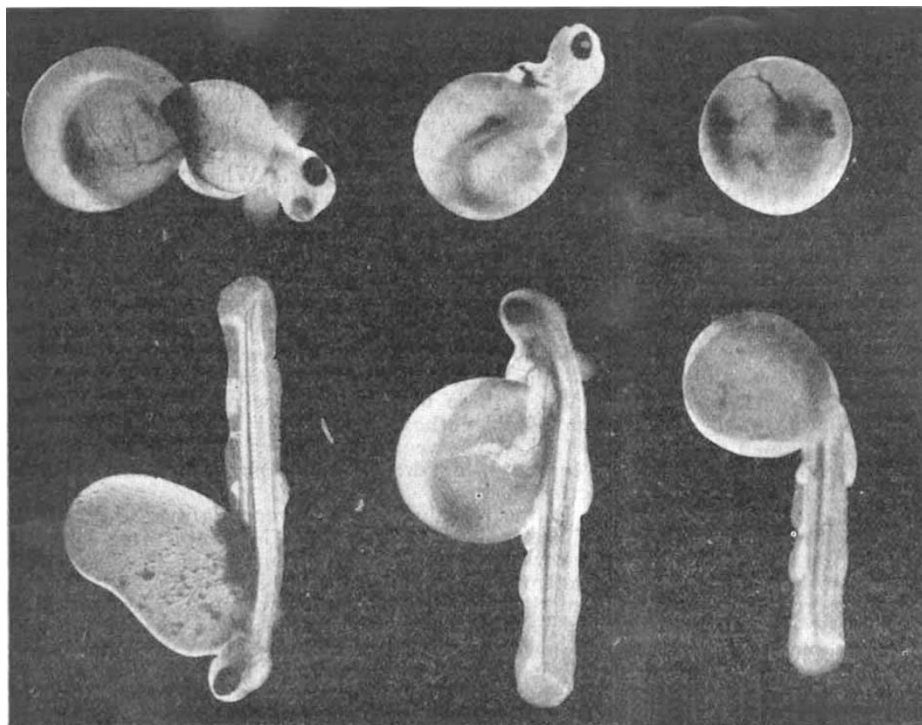


FIG. 3.—Hatching of the Salmon. From "Marvels of Fish Life."

and dogfishes are said to eat oysters (p. 150)—one would like to know where these observations were made. The starfish is also described as protruding its stomach and engulfing an oyster (p. 150)—surely this is impossible! Floating fish eggs are said to occur throughout the year (p. 109). The photograph opposite p. 190 is described as that of a shrimp. Evidently it represents a shank (*Pandalus*).

J. J.

FRANCE AND THE ENDOWMENT OF RESEARCH.

THE French intellect is proverbially clear. The quality implies foresight, no less than insight, and it is revealed in practical politics, no less than in scientific theory. It is also the characteristic of French statesmanship as well as of French thought. Nowhere is this *clairvoyante volonté* of a nation more practically demonstrated than in the attitude of the

distinguished by their eminently social and racial importance, being chiefly concerned with the purification of water supplies, and the methods of combating tuberculosis, syphilis, and other scourges.

The following grants were made in 1910:—1200*l.* to Dr. Calmette; 600*l.* to M. Rielle, for researches into the purification of water supplies; 420*l.* to the late Prof. Arloing, for researches into the prophylaxis of tuberculosis; 400*l.* to Dr. Calmette, for the same purpose; 120*l.* to Prof. Courmont, for studying the prevention of cancer; 120*l.* to M. Gaston, the prophylaxis of syphilis; 120*l.* to Prof. Gley, immunity against toxic serums. Besides these sums, nearly 5000*l.* was allotted to various researches, the total being nearly 8000*l.*, distributed thus:—Biological research, 4692*l.*; water supplies, 2460*l.*; other research, 480*l.*

This Government bureau is not managed by "permanent officials"; its council, consisting of well-known men of science, heads of industrial and commercial firms, and some politicians, is honorary. The

expenses of the department in 1910 were exactly 1901. This last detail is one of the most instructive facts in the whole business.

The receipts of the Caisse in 1910 amounted to 18,000*l.* Its income is derived thus: the greater portion is allotted annually by the State from the State revenue as part of the National Budget; this averages about 8000*l.* Investments of capital bring in an increasing sum. Lastly, there are bequests, subscriptions, and gifts, from corporate bodies, societies, and individuals. This last source naturally fluctuates. In its ten years' history the Caisse has distributed 56,000*l.*, of which 36,000*l.* was allotted to biological researches, and 16,000*l.* to investigations and experiments connected with the purification of water supplies.

M. de Foville points out that the financial needs of science increase with the scale of scientific operations and with progress generally, and recommends the Caisse as a channel for private donations which has the advantage of imposing no restrictions or death-duties on bequests made to its funds.

France is also to be congratulated on possessing a society, *de Secours des Amis des Sciences*, the object of which is to aid men of science and inventors who are in material difficulties, and to relieve their widows and children from destitution. Founded by Baron L. J. Thenard in 1857, the society has distributed up to the present time more than 95,000*l.* (not a million pounds, as the *Athenaeum* of October 14 states). Prof. G. Darboux makes an eloquent appeal on its behalf to those who, like great industrial and commercial capitalists, owe so much to science, pure and applied. He points out that as the number of engineers, chemists, naturalists, biologists, and inventors increases, the risks increase proportionally, and the numbers, both of martyrs of science and of victims of *la misère*, with them. Charity of this kind, to those who have assisted to prevent human suffering, is, as the founder of the society remarked, "a work of reparation and of social justice."

England has only the precarious and arbitrary awards of the Civil List. The French charitable society is a complementary institution to its State aid of research. In it there is a channel for the charitable impulse, more humane and more patriotic than many of the usual forms of relief of destitution. As for the Caisse des recherches scientifiques, France has practically instituted (and the institution will grow) the Establishment of Science. In this is the Erastianism, and a sound Erastianism, of the future.

A. E. CRAWLEY.

FACTS OF MIGRATION.¹

FOR learned and unlearned alike there is a peculiar fascination in the migrational movements of birds, and the more we know about them the more the wonder grows. The problems now clearly discerned will probably afford material for several centuries of inquiry, and there are others which we have not yet learned to state. In all such cases it seems to be in accordance with sound scientific method that we should tackle the more tangible problems first, that we should accumulate facts on all sides, and that we should pursue different paths of inquiry in the hope that their convergence may lead us to discovery. That

we should occasionally relieve tension by flying a speculative kite will do no harm to anyone.

Of the various paths of inquiry three stand out prominently, and as each is not only theoretically reasonable, but has already led to something definite, it is gratuitous to pit one against another when more than all are needed. First, there is the method of registering the arrivals and departures, the changes and movements, in a small area, like Helgoland or Fair Island, which can be thoroughly explored. Second, there is the method of marking large numbers of migrants with indexed aluminium rings, in the hope of hearing again of the whereabouts of a small percentage. How this method has already led to the marking out of a more than provisional migrational-route for the white stork is well known. Third, there is the method of collecting data, year after year, from observers scattered over a wide area, both inland and on lighthouses and lightships, who record times of arrival and departure, great wave-like incursions, marked increase and decrease in numbers, and the like.

It is this third method which has been followed with praiseworthy persistence during the past six years by the British Ornithologists' Club, the facts reached being recorded in a series of reports, of which the sixth is now before us. What we have we are grateful for, and we would claim recognition for the industry and patience which the preparation of these reports has demanded from the members of the Migration Committee of the club, from the editor, Mr. W. R. Ogilvie-Grant, and from the large body of observers throughout the country. It is no disparagement, however, to point out that the report has scarcely as yet got beyond the raw materials of science. As the introduction states emphatically enough:—"When these investigations were first undertaken it was decided that they should be carried on over a period of ten years before any attempt was made to generalise, or draw deductions from the facts collected."

In the introduction a reference is made to a notice of last year's report (*NATURE*, March 9, 1910), in which a reviewer suggested (among other things) that a systematic "ringing" of the birds at the light stations would probably produce good results. To us also this seems a good suggestion, and the members of the committee are theoretically of the same mind. We regret to see, however, that they regard it as "quite impracticable." "We owe much to the courtesy of the Elder Brethren for allowing their keepers to fill in our schedules, but the latter could not be expected to 'ring' birds, nor is it to be expected that the authorities would allow unofficial observers to remain at the lights during the migration-season." We wonder, however, whether the difficulties are insurmountable. If so, it is a great pity. The lights are strategic points, the number of birds that might be "ringed" is often large, and a little "ringing" might save some of the keepers from life-harming heaviness.

The arrival of our summer migrants began in 1910 on March 5 (with the chiffchaff), but it proceeded slowly through that somewhat exceptionally fine month. Except in the case of a few species, the immigration did not begin until April 2, and continued until May 23. After that there was little movement observed, but a few species were unusually late (most of May was cold, inclement, and wet). The main body of spotted flycatchers did not arrive until June, and in some places sedge-warblers had not reached their breeding haunts by May 13. It will be very interesting to compare the data for 1910 with those for the extraordinarily fine summer of 1911, and it

¹ Bulletin of the British Ornithological Club, edited by W. R. Ogilvie-Grant. Vol. xxviii. Report on the immigration of summer residents in the spring of 1910; and also notes on the migratory movements and records received from lighthouses and light vessels during the autumn of 1909. By the Committee appointed by the British Ornithologists' Club. August, 1911. Pp. 313. Many maps. (London: Witherby and Co.) Price 6s.