way back, literally inch by inch, through a single small group of strata. Only thus could he base on the laboriously collected facts a single true interpretation; and to those who preferred the broad path of generality his interpretations seemed, as Bacon says they always "must seem, harsh and discordant—almost like mysteries of faith."

It is impossible to read these words without thinking of one "naturæ minister et interpres," whose genius was the first in this country to appreciate and apply to paleontology the Novum Organon. Devoting his whole life to abstruse research, he has persevered with this method in the face of distrust and has produced a series of brilliant studies which, whatever their defects, have illuminated the problems of stratigraphy and gone far to revolutionize systematic paleontology. Many are the workers of to-day who acknowledge a master in Sydney Savory Buckman.

I have long believed that the only safe mode of advance in paleontology is that which Bacon counselled and Buckman has practised, namely, "uniformly and step by step." Was this not indeed the principle that guided Linnæus himself? Not till we have linked species into lineages, can we group them into genera; not till we have unravelled the strands by which genus is connected with genus can we draw the limits of families. Not till that has been accomplished can we see how the lines of descent diverge or converge, so as to warrant the establishment of orders. Thus by degrees we reject the old slippery stepping-stones that so often toppled us into the stream, and foot by foot, we build a secure bridge over the waters of ignorance.

Francis Arthur Bather

ATLANTIC AND PACIFIC SALMON

History repeats itself with monotonous regularity and the most patent facts of scientific knowledge apparently make no impression on the people at large even where their own interests are vitally concerned. They try over and over the same experiment and after the clearly foretold results have been secured they lament the unfortunate consequences. Not only that but an expenditure of money to improve the situation is often rendered useless by action which passes without adequate protest from those most immediately interested.

In former centuries the Atlantic salmon ran yearly in the rivers of the New England coast in such numbers as to excite the amazement of our forefathers. They thought the supply inexhaustible but in 1798 a dam was erected on the Connecticut River and the results are thus described by Jordan and Evermann.

> The salmon was at one time very abundant in the Connecticut, and it probably occurred in the Housatonic and Hudson. . . . The circumstances of their extermination in the Connecticut are well known, and the same story, with names and dates changed, serves equally well for other rivers.
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> In 1798 a corporation known as the Upper Locks and Canal Company built a dam 16 feet high at Millers River, 100 miles from the mouth of the Connecticut. For two or three years fish were seen in great abundance below the dam, and for perhaps ten years they continued to appear, vainly striving to reach their spawning grounds; but soon the work of extermination was complete. When, in 1872, a solitary salmon made its appearance, the Saybrook fishermen did not know what it was.

The experiment has been tried in many other places and each time the result has been the same. We have heard much in recent years about the dangers confronting the Pacific salmon which furnishes so important a part of the food supply of this country and of other parts of the world. Scientific men have called attention to the serious dangers which ill-considered promotion and careless destruction of spawning grounds have brought to bear on the supply of this splendid fish.

In response to these warnings President Roosevelt appointed a commission for the investigation of problems connected with the Pacific salmon and its fisheries and Congress has continued the work of studying the situation and of aiding the fish to maintain its position by the establishment and development of hatcheries. One of the oldest and most prominent is at Baird, California. It is accordingly

with grave apprehension that I have read the following paragraph in a recent publication.

> Only a few spring-run fish have been in McCloud River at Baird, California, and the dam without a fishway in the Sacramento River is to a considerable extent responsible for the condition which threatens to render the Baird hatchery useless.

In California certain state officials have suggested that since the dam was constructed without a permit from the War Department, action to correct the evil should be taken by the United States authorities. But since the Sacramento River at the point in question has not been adjudged a navigable stream, no permit was required and the matter falls legally wholly under the control of the state of California. It is pertinent to ask whether that state is so lacking in foresight and its officers so devoid of responsibility for public interests that they will continue to permit conditions that menace thus directly the public welfare.

But the question has an even broader aspect. These fish are a national asset. They are born in the waters of an individual state but they soon pass into the ocean, glean from it without expense to any state or nation the supply of energy that brings them back at stated periods to contribute to individual enterprise and to national food supply a harvest that is of all which man gathers the most profitable because it demands least care and utilizes for its production otherwise unused sources of energy.

The nation is vitally concerned with impending danger. It has contributed the means by which the hatchery is maintained and it has a moral if not a full legal right to see that no private agencies thus in irresponsible manner destroy the results of its efforts. Some way should be found and some agency invigorated to the point where it will insist upon the maintenance of proper fishways even though this involve expense upon the interests involved.

This is, however, only one phase of a question which has many aspects. The run of Pacific salmon has entirely disappeared in some streams. In others it has been tremendously impaired. In districts like Puget Sound it has sunk to a fraction of its former size and during 1919 only one district in Alaska reported a catch that equalled 100 per cent. of the number for the preceding ten years. Furthermore these results were obtained by the use of more boats, more men, more gear and other destructive appliances than had ever been in service before.

In his latest report the United States Commissioner of Fisheries calls attention to the situation in so far as it concerns Alaska waters and the salmon therein, in the following terms:

> For about eight years legislation affecting the fisheries of Alaska has been pending in Congress. Protracted hearings have been presented to the appropriate committees of the two houses. The necessity for a radical revision of the existing salmon law has been especially pointed out by various agencies and persons interested in the welfare of the fisheries of Alaska, and congressional committees have made favorable reports on bills embodying new legislation.
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> No new fishery laws have, however, been enacted; and the fisheries of Alaska, at the most critical period of their history, remain subject to laws which have been shown to be obsolete and inadequate. The Bureau of Fisheries is thus placed at a great disadvantage in administering the salmon fisheries of Alaska and can not justly be held accountable for conditions, practises and developments which, while having the full sanction of law, are not necessarily compatible with the perpetuation of the supply and in some respects are directly opposed thereto.

Concerning the magnitude of the problem the same report speaks in another place thus:

> It is the salmon industry which gives to the fisheries of Alaska their great importance, and it was the salmon industry that contributed most notably to the increases that occurred in 1918. The value of all salmon products was $53,514,812, of which $51,041,949, represented canned fish to the number of 6,605,835 cases. Thus, 50 years after Alaska became a part of our national domain, the salmon resources alone yielded a product valued at over 7½ times the purchase price of the territory.

The public interest thus put in jeopardy is of the first magnitude and the danger both

real and immediate. Biologists know how rapidly the progress of destruction proceeds and how soon the end comes when the diminution in numbers of any species has once become conspicuous. Increasing values always lead to redoubled efforts and multiplied appliances for securing a catch and the vicious cycle gains in velocity as it decreases in diameter.

The commercial interests are strangling the goose that has laid for them so many golden eggs and some are beginning to be apprehensive for the future. Unless public sentiment can be developed, unless the efforts of the Bureau of Fisheries can be supported by adequate appropriations, and unless the taking of salmon can be subjected to reasonable restrictions that splendid fish will in a short time be as much of a luxury on the Pacific coast as its congener is to-day on the Atlantic.

Henry B. Ward

JOSEPH PANTEL (1853–1920), A JESUIT AND A SCIENTIST

The first days of last February saw the closing of a remarkable scientific career, when the death of Fr. Pantel, S.J., occurred in Toulouse, France. By dint of tireless work and scientific investigations, he had gained for himself an international reputation. He had developed a keen power of observation and was considered by all the men of science who knew him as a first class biologist.

Twice the Academy of Sciences of Paris recognized the merits of his works. In 1898, it conferred on him the "Thore Prize" for his masterly monograph on the "*Thrixion halidayanum*"; in 1906, the "Gama Machado Prize" for his studies on the cells of the masculine type of the "*Notonecta glauca.*" This second time the work had been done in collaboration with his disciple, Rev. Robert de Sinéty, S.J.

In 1891–92 he studied at Louvain University in the Carnoy Laboratory. In later years the systematic study of the Coleoptera and Orthoptera, their anatomy and biology, constituted the main guiding lines of his research work. The observations and discoveries he made were published by several scientific magazines, *La Cellule* and *Le Neuraxe,* of Louvain, and by many scientific societies, The Royal Spanish Society of Natural History, The Royal Academy of Arts and Sciences of Barcelona, the Entomological Societies of France, Holland and others.

The most famous entomologists of Europe revered his learning and admired his modesty. In his honor they designated several new species with the name of "*Panteli*" and several genera—a genus of Orthoptera "*Pantelia*" (Bolivar) and a genus of Diptera "*Panteliola*" (Rev. Kieffer). Dr. P. Halbfass, teaching in the University of Munster in 1903, spoke of Fr. Pantel in glowing terms of admiration. Being a Lutheran, he did not mention to the class that Fr. Pantel was a Jesuit but he confessed that he had been sent to study under his direction by his well-known professor, Dr. O. Hertwig, who saw in Fr. Pantel an eminent scientist.

Parasitism among insects, customs and social habits of the pirates and robbers among the winged tribe, the shameless impudence of beggarly insects which cause the death of others in order that they may live—such were the topics of interest in the studies of Fr. Pantel.

After the war the services of Fr. Pantel as professor were enlisted in the Catholic Scientific Institute of Toulouse. The writer can testify that, in the work of the class-room, Fr. Pantel was equally eminent. His lectures were always very carefully prepared and delivered, the right word always in the right place. No unnecessary repetitions that tire the mind or distract the attention. Fr. Pantel gave his lectures, guided by psychological principles and never did spare labor to obtain the best results in the shortest time. As an instance of the last assertion the writer may adduce the fact of Fr. Pantel's spending in his early career 17 hours work for the preparation of a class-room lecture lasting 55 minutes.

The number of students who came to attend his lectures was a silent testimony of the value of his teaching. They came from Spain, Por-