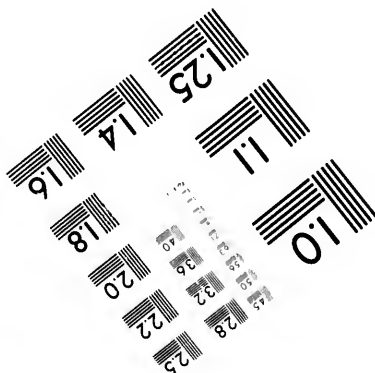
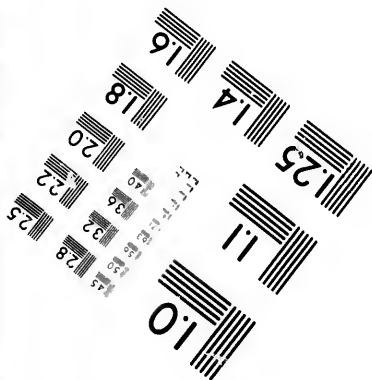
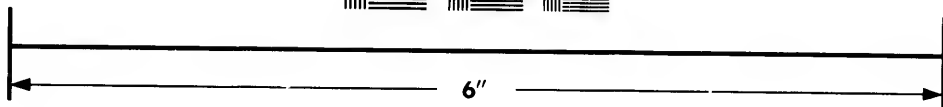
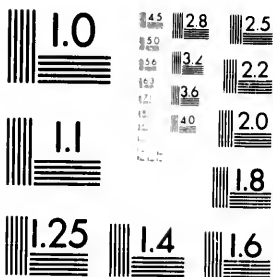


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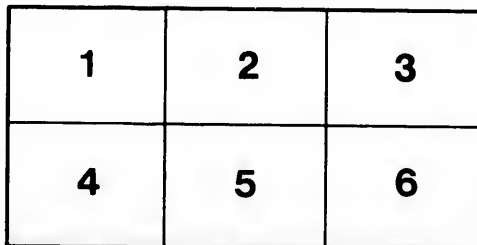
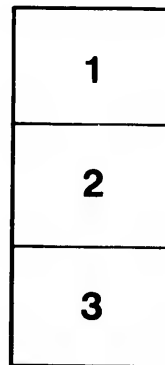
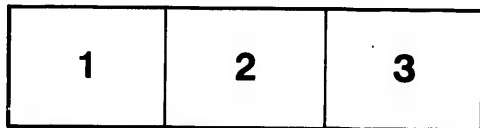
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A GREAT SCOTTISH NATURALIST.

NOTES ON THE SCIENTIFIC LABOURS

OF

PROFESSOR McINTOSH, F.R.S., OF ST. ANDREWS.

(Read before the Andersonian Naturalists' Society, Glasgow, March 1st, 1893.)

BY

EDWARD E. PRINCE, B.A., F.L.S.,

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A GREAT SCOTTISH NATURALIST.

WHEN the immortal Kant died, the good citizens of Königsberg felt his loss, we are told, because, having noted the rigid regularity of his daily movements, they were accustomed to set their clocks and watches when he passed their doors on his habitual afternoon walk. They were ill able to realise that in their midst had lived one of the leaders of European thought. It is, indeed, always difficult for those amongst whom a distinguished worker moves to appraise his achievements. It may be impossible for them to assign him his true place—posterity alone can do that—but it is a wise course at times to make the attempt. A survey of the labours of a distinguished contemporary may help us to estimate our progress, and realise, in some measure, where we stand. It may do more; it may act as a stimulus to other workers.

Amongst living Zoologists there are few whose work has been more varied and prolific than that of Professor McIntosh, of St. Andrews. In the field of Marine Zoology and Fishery Science it may be doubted whether any other European authority has accomplished so much, or attained so eminent a position. Since the date, more than twenty years ago, when Professor Allman spoke of the studies carried on by Professor McIntosh as researches “by which the zoological literature, not only of this country, but of the continent of Europe, has so largely benefited,” Dr. McIntosh has continued to add, without cessation, new contributions to our knowledge of the sea’s inhabitants. The fishery and marine scientific labours of Professor McIntosh for extent and sterling value have never been surpassed.

Born in St. Andrews, in 1838, he received his education at the Madras College and the ancient University of his native

city; and later at the University of Edinburgh, where he had a distinguished career, he was awarded a gold medal on graduating M.D. in 1860. His thesis was entitled "Observations and Experiments on *Carcinus mænas* (the Shore Crab)." But he also wrote, while at the University, Essays on "The Arrangement of the Muscular Fibres of the Heart,"—a subject subsequently followed up by his colleague, Professor Bell Pettigrew, of St. Andrew's,—and on "The Morbid Impulses of the Insane." He was initiated into the art of dredging and marine research by the veteran Zoologist, Professor Allman, and was more or less closely associated with many of the brilliant group of scientific men at that time connected with Edinburgh, such as Sir David Brewster, Sir Robert Christison, Sir James Simpson, Professors Goodsir and Lyon Playfair. Dr. Lauder Lindsay referred to him as "one of the foremost students of his day at College: a worker as ingenious as indefatigable, and as successful as industrious;" but, though his early inclinations pointed to zoological work, he decided, on the recommendation of Professors Goodsir, Laycock, and others, to enter Asylum practice, and in 1863 was promoted to the responsible position of Medical Superintendent at the great Murthly Institution. Arduous official duties did not prevent the prosecution of elaborate studies in Natural History, and between 1862 and 1870 he published a numerous series of Original Papers, including some valuable fishery contributions. One of the earliest, indeed, dealt with the "Food and Parasites of the Salmon," based upon the study of a large collection of illustrative specimens; while in the "Microscopical Journal," in 1868, he detailed a number of experiments on the young salmon, with a striking plate of the alevin stage; and later described the "Yellow-Fins of the Allan Water," and gave an account of "The Examination of the Male Kelt." Other papers at this time described "The Hairs of *Carcinus mænas*," some curious marine forms, including *Edwardisia*, *Aleyonium*, and the Nudibranchiate Mollusca of St. Andrews Bay. Some of these were published by the Linnean Society of London; but others were communicated by Professor Allman to the Royal Society of Edinburgh, in the "Proceedings"

of which Society also appeared the first report of those notable marine cruises by which Professor McIntosh has so remarkably advanced our scientific acquaintance with the oceanic fauna. The report is entitled "Marine Zoology of North Uist and the Outer Hebrides," and the list embraces miscellaneous captures, ranging from zoophytes up to fishes. The accuracy and laborious nature of this paper are features common to all Professor McIntosh's contributions to science. Sir William Turner, at an early stage in Dr. McIntosh's career, expressed his admiration for "the great talent in original and independent investigation" revealed in them. That they should mainly treat of marine animals is not surprising, for the rich treasures of the bay facing the city of St. Andrews had, from boyhood, fascinated him, and the lectures of Professors Day and Macdonald in the United College had further stimulated him. "He evinced great promise as a student of Human and Comparative Anatomy . . . in my classes at St. Andrews," wrote the former in 1861.

Professor McIntosh rose rapidly to the position of a leading Marine Zoologist, so that twenty years later his former teacher, Professor Day, was able to say of him that "in one of the most important and difficult branches of Zoology, Dr. McIntosh is unquestionably the highest British authority," and added that his "Zoological labours are as fully recognised in France and Germany as at home." Hence his scientific aid was sought as early as the year 1867 by Dr. Gwyn Jeffreys, who entrusted to him a valuable collection of specimens dredged off the Shetland Isles, and of these a report was published in the *Annals of Natural History* (1868). "Notes on *Pelonaia corrugata*," a St. Andrews rarity; and a study in teratology "On the structure of a monstrous Kitten," in the *Journal of Anatomy*, appeared about the same time; and towards the close of the year 1868 their author gained the Neill Gold Medal at the hands of the Royal Society of Edinburgh, of which he had been elected Fellow.

Professor McIntosh's fishery and marine researches reach over a very large area, and his special studies upon one extensive group, the marine Annelids, have gained for him a world-

wide reputation, and a place in the front rank of living naturalists. Papers on the vexed question of the boring of sea-worms, discussed at the Dundee meeting of the British Association, and on the "Development of Lost Parts in Nemer-teans," read to the Linnean Society in 1868, heralded one of the most remarkable memoirs which European Zoology can boast, namely, the great work "On the Structure of British Nemer-teans,"--a treatise of which the gifted and lamented Edward Claparede wrote :--" I opine that this work and that of Kerfer-stein, will form henceforth the basis of all new researches on the Nemerteans." It occupies about 100 pages in the Trans-actions of the Royal Society of Edinburgh, and the thirteen accompanying plates, for elaborate complexity of detail and delicate delineation have, perhaps, never been excelled. Its publication prompted Professor Ray Lankester to say that British Science could not be on the decline when it had pro-duced a memoir so masterly and distinguished by so many beautiful illustrations. The famous Dr. Lockhart Clarke said of this paper and its author, that it " would alone have obtained for him an eminent name." The Annelids, notwith-standing their marvellous beauty of colour and form, and the interest of their structure and habits, had suffered a neglect that prompted Professor McIntosh, as he himself has con-fessed, to forsake the Crustacean researches which first occu-pied him, and devote his attention so largely to the Marine Worms.

When the Ray Society undertook the publication of Dr. McIntosh's " Monograph of the British Annelida," it was no surprise to the scientific world that Part I., treating of the Nemerteans, should at once be assigned a place amongst the most important published researches of our time. All Professor McIntosh's illustrated papers are remarkable for the artistic qualities of the drawings; but it is not too much to say of the twenty-three tinted plates issued by the Ray Society, that they are superb examples of scientific illustration. The beau-tiful coloured figures were the work of Professor McIntosh's gifted sister, the late Mrs. Albert Günther. Reports on impor-tant collections made during various cruises under Government

and other auspices have largely occupied the attention of Professor McIntosh. Annelids from Canada, Kerguelen's Island (Transit of Venus Expedition), from the Polar Seas (British North Polar Expedition), and extensive collections made by the "Valorous" and the "Porcupine" have passed under his skilled examination; but his greatest achievement of this kind is the ponderous volume dealing with the collection brought home by H.M.S. Challenger,—a volume which the late Dr. W. B. Carpenter prophesied would "mark an era in our knowledge of this important division of the Marine Invertebrata." Extending to almost six hundred pages, and embracing nearly a hundred exquisite plates, it forms one of the most valuable of the great "Challenger" series, and occupied nearly seven years in its preparation. Thousands of microscopic sections were prepared and examined, while a considerable proportion of the species described were entirely new to science. "I consider myself very fortunate," Sir Wyville Thomson has recorded of Professor McIntosh, "in having secured his co-operation," adding the remarkable statement, that Dr. McIntosh "pursued his scientific researches heavily weighted by arduous professional duties."

Amongst the most curious discoveries in modern Biology is that by Professor McIntosh of an intricately branched Annelid, *Syllis ramosa*, figured and fully described in the "Challenger" report; other volumes of which include reports on *Phoronis* and *Cephalodiscus dodecalophus*, the latter perhaps the strangest of all the strange "Challenger" captures. So odd and novel was this creature, that after being eliminated from the collection of Annelids sent to Dr. McIntosh, it was, in the last resort, returned to him, because various authorities, home and foreign, had declined to include it in their apportioned series. Professor McIntosh determined this form to belong to the Polyzoa. Dr. McIntosh's long-continued and splendid services to science have been fully recognised abroad; his descriptions and figures have been laid under contribution by the greatest continental authorities; and in Gegenbaur's famous text-book, amongst the few British memoirs from which figures are taken, Professor McIntosh's are included. His

lengthy monograph on *Magelona*, with ten plates, printed in German, is noteworthy—as Dr. Carpenter remarks, “its publication in Siebold and Kölliker’s *Zeitschrift* shows the full appreciation of Dr. McIntosh’s work by the most distinguished continental labourers in the same field.”

To the public generally Professor McIntosh is best known as the leading British authority on Fisheries. Not a year has passed during the last decade, which has not seen new discoveries and admirable reports concerning the eggs, the young larvæ, and later life-history of the most valuable food fishes, this work having been chiefly carried on at the St. Andrews Marine Laboratory (under the Fishery Board for Scotland), of which Professor McIntosh has been director since its establishment in 1884. Over thirty separate fishery papers have been issued by Professor McIntosh from the St. Andrews Laboratory. In 1884 he was selected by the Government to conduct a series of scientific observations in connection with the Royal Commission on Beam Trawling. The report embodying these is, Sir Lyon (now Lord) Playfair, stated in the House of Commons, one of the most valuable fishery publications ever issued. The labours involved in its preparation were referred to by the late Earl of Dalhousie, when he moved the Sea Fisheries’ (Scotland) Bill, on May 21st, 1885, in the House of Lords, and no man was better qualified to express an opinion. “An eminent naturalist, Professor McIntosh, was appointed,” said the lamented Earl, “to conduct experiments on board a steam trawler. He carried on experiments for nine months, showing much heroism and enduring a great deal of hardship in the execution of his task.” Besides giving invaluable evidence before this important Commission, and before the Departmental Committee on Scottish Bait Beds, presided over by the Rt. Hon. Edward Marjoribanks, M.P., Professor McIntosh contributed to the discussions of the International Fisheries’ Conference in 1890, and the following year surveyed the great Yorkshire Estuaries, and compiled an elaborate report on the Mussel Beds of the Tees, Esk, and Humber, at the request of the North-Eastern Sea Fisheries’ Council.

The annual reports of the Scottish Fishery Board bear

witness to the incessant labours of Professor McIntosh, and one notable memoir of this kind,* on "The Development and Life-History of the Teleostean Food and other Fishes" has been characterised in the Fishery Board Report for 1890, as embodying "the most extensive research yet made on the development of the food-fishes and the habits of the young." An astonishing number of species have been hatched, reared, and studied by Professor McIntosh, in addition to tow-net, mid-water, and deep-sea work—this combination of practical knowledge and exact laboratory study being a marked feature in all these researches.

When it is remembered that barely ten years ago we had almost no knowledge of the spawning of fishes in British Seas—that the hatching of the young and their later history were wholly ignorant of, and that the valuable body of facts now in our possession we owe chiefly, well-nigh solely, to Professor McIntosh, the achievements of the great Scottish naturalist appear nothing less than marvellous. The occurrence of the herring's eggs on the rocky sea bottom had long been known, and Professor G. O. Sars found the eggs of the cod and gurnard floating in northern waters, but neither fishermen, scientific workers, nor people generally had the slightest notion that the eggs of our most valuable food-fishes float in multitudes near the sea's surface.

Professor McIntosh has proved that the haddock, whiting, sole, turbot, ling, and hosts of other familiar fishes, scatter their floating eggs in the upper waters of the sea, and the delicate larvae and older fry haunt the same regions.

These astounding discoveries are of immense value to our sea fisheries; they have aroused intense interest amongst biologists, and the fishermen upon our coasts are gradually realising the marvellous character of Professor McIntosh's work. In recent years Professor McIntosh has been materially helped in his labours at St. Andrews by Scottish fishermen. Their interest was largely secured by the patience and sagacity of the late Lord Dalhousie, so that, as Professor

* This memoir is the conjoint work of Professor McIntosh and the present writer,

McIntosh has recorded, "men who had refused to listen to any other view than that all marine food-fishes deposited their eggs on the bottom—by and by took jars in their boats to sea, and brought to the laboratory the floating eggs removed from the parents with their own hands, or captured in tow-nets near the surface."

Numerous papers on the surface fauna of the sea in successive seasons testify to an incredible amount of toil and close observation, while elaborate notes on the food of fishes, collected during a long period, have formed the basis of all subsequent work in this important line of study. The late Francis Day, in his well-known paper read at the Fisheries' Exhibition Conference, London, depended chiefly upon Professor McIntosh's published researches on this subject. The number of his Zoological papers and memoirs exceed a hundred, illustrated by more than 250 original plates. From the eminence of his position in the front rank of fishery authorities, and in the wider sphere of Zoological science, it is not surprising that honours have been freely bestowed upon him. The Blue Ribbon of Science; the Fellowship of the Royal Society was conferred several years ago, and the LL.D. of St. Andrews in 1878; he is a Fellow of the Royal Society of Edinburgh, of the Linnean Society, and a Corresponding Member of the Zoological Society. The Honorary Membership of the Psychological Society of Paris has been conferred on him, as well as that of the Societe Centrale d' Aquiculture de France, the Marine Fisheries' Society, Grimsby, the Natural History Society of Glasgow, and many other British and Foreign Scientific Associations.

Professor McIntosh was appointed to the Chair of Natural History in the University of St. Andrews in 1882, and has been frequently an Examiner in Natural History in Edinburgh University. He delivered a notable lecture on Marine Fishes, at the Royal Institution, London, in 1889, and has lectured in various populous centres under the Gilchrist Trust. In 1855 he was President of the Biology Section of the British Association, and gave an exhaustive address on the difficult subject of "Animal Phosphorescence." As Superintendent of

Natural History, Perth Museum; Director of the University Museum, St. Andrews; Convener of the Lands Committee, United College; and an energetic occupant of many academic offices, Professor McIntosh has shewn himself an untiring and efficient administrator. There are few naturalists of eminence, German, Italian, American, Australian, Dutch, or Norse, who do not delight to count Professor McIntosh an honoured personal friend; and this esteem of British and foreign colleagues has been abundantly testified by their signalling with his name numerous animals new to Science. Bowerbank named a new sponge *Halichondria McIntoshii*; Professor Ray Lancaster named a Gephyrean *Golfingia McIntoshii*; Professor Hubrecht distinguished *Echinoptilum McIntoshii*, and Professor Haddon *Epizoanthus McIntoshii*; while Berger's *Carinella McIntoshii*, and M. Giard's special group of worms, the genus *Intoshia*, are other examples from a lengthy list.

That Charles Darwin, Carl Vogt, Huxley, Anton Dohrn, and others of the most brilliant scientific men of our day should agree in Allen Thomson's flattering testimony respecting Professor McIntosh's fruitful researches, that they "are considered by the best authorities of this and other countries to have given him a high rank among the Comparative Anatomists and Naturalists of the day," is proof sufficient that we have in our midst one of the most devoted, honoured, and successful discoverers in the whole field of Biological Science.



