SCIENCE

FRIDAY, JUNE 6, 1919

CONTENTS

Sir Joseph Hooker: PROFESSOR T. D. A. COCKERELL 525

A Suggestion from Plato with others: DR. A. W. MEYER 530

The Roosevelt Wild-life Forest Experiment Station: DR. CHARLES C. ADAMS 533

Gabriel Marcus Green 534

Scientific Events:—

Inter-allied Cooperation in Chemistry; The British Imperial Antarctic Expedition; Outline Map of the United States; The LeConte Memorial Lectures in the Yosemite 535

Scientific Notes and News 538

University and Educational News 540

Discussion and Correspondence:—

The Cumberland Falls Meteorite: DR. ARTHUR M. MILLER. *On the Auroral Display:* DR. CHARLES F. BROOKS. *The Meeting of Plant Pathologists on Long Island to discuss Potato Diseases* 541

Scientific Books:—

Appendages of Trilobites: G. R. BRIGHAM. 543

Special Articles:—

Presoaking as a Means of preventing Seed Injury due to Disinfectants and of Increasing Germicidal Efficiency: HARRY BRAUN... 544

The American Philosophical Society: PROFESSOR ARTHUR W. GOODSPEED 545

MSS. intended for publication and books, etc., intended for review should be sent to The Editor of Science, Garrison-on-Hudson, N. Y.

SIR JOSEPH HOOKER[1]

With the passage of time the importance attached to persons and events becomes strangely altered. History, to be of value to posterity, must be both more and less than a faithful chronicle of the past. Less, if only to bring it within intelligible limits; more, because it must see causes in relation to effects, emphasizing the inconspicuous beginnings of new developments. For such reasons, the judgment of posferity will nearly always differ from that of contemporaries; not necessarily because posterity is endowed with superior wisdom, but rather because the basis of judgment is different. Sir Joseph Hooker and his father, Sir William Hooker (1785–1865), were both botanists of the highest eminence, their combined activities covering more than a century. As we review their careers, we do not know which to admire most. The son, without the slightest false modesty, always insisted on his father's preeminence, giving good reasons for his judgment. It was William Hooker who, with extraordinary energy and enthusiasm, had created great botanical centers, first at Glasgow, and then for the whole British Empire at Kew. When the work was most difficult and recognition hardest to obtain, he had won support and respect; and had laid the foundations on which his son was to build. It is difficult for us, to-day, to realize the labor and vision required to build up the establishment at Kew, in the face of ignorance and opposition. It is difficult for posterity to do full justice to the elder Hooker, just because we can no longer clearly visualize the environment in which he lived. His work, everywhere woven into the fabric of modern botany, has few outstanding or picturesque features. In the case of Sir Joseph Hooker, the imagina-

[1] *Life and Letters of Sir Joseph Dalton Hooker.* By LEONARD HUXLEY. 2 vols. New York, D. Appleton & Co. 1918.

tion is more easily quickened. Aside from his great merits as a master of technical botany, he will always live in the pages of history as one of the group of men immediately associated with Darwin. The personalities of Darwin, Hooker, Huxley and Wallace stand out in the history of biological science in such a manner that they are never likely to be forgotton. On the contrary, because they will be taken as typical of a movement and a period, they will increase rather than diminish in the estimation of mankind. They will have the value of a moral force; veritable saints of science, patterns for all later generations. In strict equity, it may be that Hooker should not stand on so high a pedestal as we shall place him, but we are concerned rather with our needs than his deserts.

Under these circumstances, an authoritative and full account of the life of Sir Joseph Hooker becomes a necessity. This work, written by Leonard Huxley, and based on materials collected and arranged by Lady Hooker, has just been published in two volumes, and is the subject of this notice. It is the story of a long life of incessant activity; devoted to the classification and description of plants, the administration of a great botanical establishment, and to explorations in distant regions. In 1837 Hooker published the descriptions of three new mosses; in 1911 he published a number of new species of *Impatiens*. Such a record is surely unique. It seems strange to think that this man, whose living presence is still vividly in our mind, knew four of the founders of the Linnean Society, and talked with Humboldt. There is an amusing account of his first meeting with Humboldt in Paris:

On putting up here I sent in my card with Mr. Brown's books to Baron Humboldt; he was not at home, but sent his flunkey (Scotice Footman) to my bedroom at eight o'clock yesterday morning to say his master wished to see me at nine o'clock. Ten minutes after his Lord had grown impatient and sent to say he was all ready, so I went in and saw to my horror a *punchy little German*, instead of a Humboldt. There was no mistaking his head, however, which is exceedingly like all the portraits, though now powdered with white. I expected to see a fine fellow six feet without his boots, who would make as few steps to get up Chimborazo as thoughts to solve a problem. I can not now at all fancy his trotting along the Cordillera as I once supposed he would have *stalked*. However, he received me most kindly and made a great many enquiries about all at Kew and in England.

Later on, Hooker was able to emulate Humboldt in the exploration of mountains, but on the other side of the world—in the Himalayas. The story of his Indian work is well known, but is of perennial interest. He did much more than explore new regions and find new plants. India is indebted to him for much of her scientific development and material prosperity. When he went there, he found the government singularly apathetic as regards science. He went out with Lord Dalhousie, the governor-general, who took a fancy to him and treated him very kindly, but had no interest in botany. In a letter home he relates:

I find Lord Dalhousie an extremely agreeable and intelligent man in everything but natural history and science of which he has a lamentably low opinion, I fear. He is a perfect specimen of the miserable system of education pursued at Oxford, and as ignorant of the origin and working of our most common manufacturing products and arts as he is well informed on all matters of finance, policy, etc. I very carefully drop a little knowledge into him now and then; but I can not awaken an interest or any sympathy in my pursuits: he is much pleased at my being busy, and especially with my carrying on my meteorological register three times a day. Lady Dalhousie shares her husband's apathy, but is otherwise a kind hearted creature. In the desert I brought them the gum arabic *Acacia*, which I thought must interest the late president of the board of trade; but he chucked it out of the carriage window: and the rose of Jericho, with an interest about it of a totally different character, met no better fate.

On his return from India and indeed while he was still there, he contemplated a "Flora Indica," to contain descriptions of all known Indian plants. In a letter to his father he wrote:

It is easy to talk of a "Flora Indica," and Thomson and I do talk of it, to imbecility! But

suppose that we even adopted the size, quality of paper, brevity of description, etc., which characterized De Candolle's prodromus, and we should, even under these conditions, fill twelve such volumes, at least . . . about eighteen years' fair work would be needed.

He then asks, how is such an undertaking to be supported?—"neither our government nor the East India Company will give a sum in any way proportional to the work." But the idea was never given up, and in 1897, after an interval of about fifty years, Hooker saw the publication of the last volume of "The Flora of British India." This he regarded as only a beginning—a preliminary assembling of scattered materials—and during the last years of his life he incessantly urged Indian botanists to study the living plants, and revise every part of the "Flora.' His own work on the Balsaminaceæ, carried on after he was ninety years old, represented the beginning of such a revision.

To the last, Hooker retained his special interest in the people of India as well as its "Flora." Thus, in the year of the coronation of King Edward VII.:

As I was at the Waterloo Station yesterday, four Indian regiments filed past me—they sent the blood flying to my finger tips, such grand fellows, and such gentlemen, such proud yet pleasant faces, such an air of dignity and self-respect.

In the Himalayas, he did some geological work which later proved of more value than he had anticipated. But when he studied fossil plants, he did not consider that he was leaving his special botanical field. "I am no geologist: my work is fossil botany; as legitimately a branch of *Botany* as is muscology; fossil plants, though imperfect, are still *pure* plants; and, though dead as species, they form and show links between existing forms, upon which they throw a marvellous light." Later on, he came to be very skeptical about the value of much of the work of the paleobotanists, and in 1887 expressed himself thus:

It is an ugly fact that, tempting as is the study of fossil botany, every competent botanist with a large knowledge of existing floras, and that has tried his hand on it, has given it up, notably Brown, Brongniart and Lindley, or these have subsequently confined themselves to specimens exhibiting *structure*, as fossil wood, etc.—whilst Oliver, Bentham, etc., have only shaken their heads when asked to identify a fossil plant. If you are ever at the Herbarium and will look at the multitudes of figures of leaves in Gardner, Lesquereux and other works, the vagueness of the identifications will strike you at once. There is a standing joke at the Herbarium [Kew], if you have a plant the affinities of which puzzle you, "fossilize it and send it to a paleontologist and he will give you the genus and species at once."

As materials accumulated at Kew, and Hooker found before him long series of specimens from numerous localities, he recognized many intermediates between supposedly distinct species. Thus he was led to make great allowances for variation, becoming what is sometimes called a "lumper." Darwin called his attention to the probability that many of the observed intermediates might actually be hybrids, and in a characteristic letter he replied:

The dismal fact that you quote of hybrid transitions between *Verbascum thapsus* and *nigrum* (or whichever two it was) and its bearing on my practise of lumping species through intermediate specimens, is a very horrible one; and would open my eyes to my own blindness if nothing else could. I have long been prepared for such a case, though I once wrote much against its probability. I feel tolerably sure I must have encountered many such, but have not had the tact to discern them, when under my nose, and hence I feel as if all my vast experience in the field has been thrown away.

It seems almost unbelievable to-day, that after Hooker's splendid work on the Antarctic floras and Indian explorations, he should have been so hard put to find a means of living by botany, that he was advised to abandon the subject. He was told that there was a vacancy in the mineralogical department at the British Museum, and,

To be sure I know nothing of crystallography, mineralogy, chemistry, etc., but the trustees are above such prejudice against a man who could wear a white neckcloth with ease, and take his fair share of their abuses with equanimity, which would be an all-powerful testimonial. I hate the idea

of giving up botany, but I am advised to try for it by Gray particularly and my father proposes it.

A few years later (1854) he said:

I sometimes think seriously of giving up Kew and living in London and writing for the press.

But it could not be, and when his friend Bentham had similar doubts, he wrote:

If I thought you would be a happier man I would advise you to give up botany; but you would not be so, and evil as our days are, whether they mended or worsed, it would be all the worse to you to have given up what is at least a wholesome and constant mental resource. I sometimes despond too, but as I was once told, "I am limed to the twig." and so are you!

The names of Bentham and Hooker, authors of the "Genera Plantarum," will always remain united in scientific literature. The personal association of the two men was all that could be desired; a result of their common interests and high character. Hooker writing to the botanist Harvey in 1856, takes occasion to say:

Bentham's unselfish love of science always charms me, he has never a thought of personal aggrandizement in money or honor; but indeed we have both of us lived under the highest examples and happiest influences in these respects. My father, Bentham and Thomson are such a trio as we shall never see again. Except Faraday and Darwin I know of no others in the walks of science so pure and disinterested, except perhaps Asa Gray in America.

In 1860 Hooker settled down to the work on "Genera Plantarum," and wrote to Huxley:

We are not likely to meet except at the Linnean, for I have inaugurated a new era in my life, and am going to take the world and all that is therein as coolly as I can. When perfect myself I shall commence operating on you. What is the use of tearing your life to pieces before you are fifty? which you are (and I was) doing as fast as possible.

Huxley's reply is so good, and so pertinent just now, that it must be cited at length:

And finally as to your resolutions, my holy pilgrim, they will be kept about as long as the resolutions of anchorites who are thrown into the busy world. Or, I won't say that, for assuredly you will take the work "as coolly as you can"—and so shall I. But that coolness amounts to the red heat of properly constructed mortals.

It is no use having any false modesty about the matter. You and I, if we last ten years longer—and you by a long while first—will be the representatives of our respective lines in the country. In that capacity we shall have certain duties to perform, to ourselves, to the outside world, and to science. We shall have to swallow praise, which is no great pleasure, and to stand multitudinous bastings and irritations, which will involve a good deal of unquestionable pain. Don't flatter yourself that there is any moral chloroform by which either you or I can render ourselves insensible or acquire the habit of doing things coolly.

It is assuredly of no great use to tear one's life to pieces before one is fifty. But the alternative for men constituted on the high pressure tubular boiler principle like ourselves, is to lie still and let the devil have his own way. And I will be torn to pieces before I am forty sooner than see that.

Hooker's correspondence with Harvey brings out some of his general ideas in an interesting way. He observes how the habit of precision grows until it becomes in a sense detrimental to progress:

The besetting sin of the botanists of the day is the *craving for perfect materials;* forgetful that these sciences are all progressive, and our efforts but steps in the progression. . . . I would urge you to think now of putting together some of your ideas and facts on wider branches than purely descriptive. I think that this becomes a duty after a certain time of life with those who keep such subjects before them—too much of our dear bought experience dies with us, and the pursuit of careful descriptive botany rather renders us too timid about striking out into generalities that are the product of years of insensibly gained ideas.

It is unnecessary to recount here Hooker's part in relation to the publication of Darwin's theory, or in connection with the spread of evolutionary ideas, but there is a little bit of personal history which is as interesting as it is amusing. We have all heard of the famous debate on evolution at the meeting of the British Association, when the Bishop of Oxford and Huxley crossed swords before an excited audience. It has not been generally understood that Hooker had a conspicuous

part in this affair, and his own account of it, written at the time in a letter to Darwin, is as follows:

Well, Sam Oxon got up and spouted for half an hour with inimitable spirit, ugliness and emptiness and unfairness. I saw he was coached up by Owen and knew nothing, and he said not a syllable but what was in the Reviews; he ridiculed you badly and Huxley savagely. Huxley answered admirably and turned the tables, but he could not throw his voice over so large an assembly, nor command the audience; and he did not allude to *Sam's* weak points nor put the matter in a form or way that carried the audience. The battle waxed hot, Lady Brewster fainted, the excitement increased as others spoke; my blood boiled, I felt myself a dastard; now I saw my advantage; I swore to myself that I would smite that Amalekite, Sam, hip and thigh if my heart jumped out of my mouth, and I handed my name up to the president (Henslow) as ready to throw down the gauntlet.

I must tell you that Henslow as president would have none speak but those who had arguments to use, and four persons had been bunked by the audience and president for mere declamation: it moreover became necessary for each speaker to mount the platform, and so there I was cocked up with Sam at my right elbow, and there and then I smashed him amid rounds of applause. I hit him in the wind at the first shot in ten words taken from his own ugly mouth; and then proceeded to demonstrate in as few more: (1) that he could never have read your book, and (2) that he was absolutely ignorant of the rudiments of Botanical Science. I said a few more on the subject of my own experience and conversion, and wound up with a very few observations on the relative positions of the old and new hypotheses, and with some words of caution to the audience. Sam was shut up—had not one word to say in reply, and the meeting *was dissolved forthwith*, leaving you master of the field after four hours' battle. Huxley, who had borne all the previous brunt of the battle, and who never before (thank God) praised me to my face, told me it was splendid, and that he did not know before what stuff I was made of. I have been congratulated and thanked by the blackest coats and whitest stocks in Oxford.

Henslow, best remembered as the teacher and friend of Darwin at Cambridge, was Hooker's father-in-law. The latter's respect and affection for him were unbounded. He writes to Huxley from Henslow's deathbed:

I am utterly overwhelmed; to be loved as he was for the good he had done I would lay down my science and almost turn parson. To me personally the loss will be inmeasurable—he took interest in everything I did and I loved him—I am wrong to think how much. His loss to this neighborhood will be incalculable; there is none to take his place morally, socially or religiously.

Hooker's attitude toward Darwin was that of a disciple. Although Darwin always looked up to Hooker as his master and guide in all matters botanical, the latter could unaffectedly write in this delightful strain:

The whole thing [*i. e.*, Hooker's masterly work on Welwitschia] is, however, a dry record of singular structures, and sinks down to the level of the dullest descriptive account of dead matter beside your jolly dancing facts anent orchid-life and bee-life. I have looked at an Orchid or two since reading the Orchid book, and feel that I never could have made out one of your points, even had I limitless leisure, zeal and material. I am a dull dog, a very dull dog. I may content myself with the *per contra* reflection that you could not (be dull enough to) write a "Genera Plantarum," which is just about what I am best fitted for. I feel I have a call that way and you the other.

In his early days, Hooker took an interest in entomology; and he recurs more than once to the relationship between insects and plants as having an important bearing on the larger problems of botany. Since he had no time for entomology, it is regrettable that he did not have a group of entomological friends to work on the problems he so often had in mind. The bees of high altitudes in the Himalayas, noticed by Hooker, were first studied and described from the collections of the Thibet Mission, fifty-five years later. Darwin's orchid book suggested to him:

That insects may have a wonderful deal more to do with checking migration than climate or geographics, and that the absence of whole genera may thus one day be accounted for by absence of genera of insects: in short the cat and clover story is capable of immediate expansion by any one having sufficient knowledge of plants, insects and geography.

Also, as regards the past:

I quite believe in the sudden development of the mass of phanerogams being due to the introduction of flower-feeding insects.

While fully alive to the importance of laboratory researches, Hooker felt that nothing could take the place of a knowledge of the various kinds of plants in nature; and that after all, the whole was, in a sense, greater than its parts. In 1886 he writes to Asa Gray:

I am more and more absorbed in Indian botany, and have thrown aside all idea of making headway with—any desire to keep up with even—heads of chemico-botany, and microphytology. I may content myself with a casual grin at young men calling themselves botanists, who know nothing of plants, but the "innards" of a score or so. The pendulum will swing round, or rather back, one day.

In 1894 he recurs to the same subject, and writes to Francis Darwin:

I am glad you are going to teach the medicos a little practical botany. It is lamentable to find that all this botanical teaching of the greatest universities in England and Scotland does not turn out a single man who can turn his botanical knowledge to any use whatever to his fellow creatures. Where should we be if medicine, law or any other pursuit were taught after that fashion?

In his general ideas of education, he was "modern" in the sense of desiring practical vocational training; and in his indignation against the claims of the classicists. But he seems to have had little or no vision of an educated democracy, nor indeed of democracy in any form. He greatly admired certain characteristics of the Americans, writing to Asa Gray as early as 1854:

When you Yankees take up the higher branches of botany more generally you will turn out far more and better work than we do, for you are a far better educated, sounder, more practical people, and I look to you for the greatest discoveries, come when they may.

And in 1877, after traveling across the United States with Asa Gray, he wrote:

I had not the ghost of an adventure in America, where I saw a prodigious deal and learnt much. California was burnt up with nine months' drought, which obliterated the herbaceous vegetation and allowed me full time for the arboreous and fruticose. I was charmed with New England, disappointed with the Rocky Mountains as a range, and have no love for California, but all are full of great interest, and wonderful resources. Niagara did not disappoint me nor did the big trees. . . . The people I found to be wonderfully nice, and A. Gray is a trump in all senses.

The following, to W. E. Darwin in 1893, is singularly pertinent to-day:

I am dreamer enough to look for a time when America will forbid a European war! What a splendid rôle this would be for a nation to undertake—to send us all to our tents and tell us that we may snarl at one another in the length and breadth of Europe as much as we please, but nothing more, and that if we go further she will intervene.

Here we may leave this fascinating record of opinions and events, having quoted freely, but scarcely more than touched the treasures it contains. To have read it, following Hooker to the Antarctic, the Himalayas, the Atlas mountains and America; visiting him through it at Kew and at his home; all this is sufficient to stir the imagination and ambition of the most lethargic if he cares anything for science. The book should be in all public libraries; and it is permissible to hope that eventually a cheaper edition, perhaps somewhat abbreviated, may further widen the circle of its influence.

T. D. A. Cockerell
University of Colorado

A SUGGESTION FROM PLATO, WITH OTHERS

Students of human embryology, obstetricians and gynecologists are in daily need of terms to designate the various things included in an abortion. Many also realize the need for a more consistent use of such old words as embryonic and ovum. The word ovum constantly is used in contemporary medical literature to designate the unfertilized female sex cell; this cell when fertilized, the chorionic and amnionic vesicles with or without the contained embryo, and even the later product of conception. Under such circumstances confu-