live in a cold damp climate, and consequently never went through the intermezzo of a "British warm."

But which glacial epoch wrought all these miracles? The author, surely, does not mean the Permian glaciation; and certainly geologists tell us there was none until towards the end of the Tertiary. Perhaps the penguins had a Jurassic glacial epoch in their Antarctic realm, while owls and petrels, which, by the way, have as thick and fluffy and long-lasting Mesoptile coats as any penguins, owe these coats to our Pleistocene bad times. We can scarcely date these birds back into early Jurassic times like the penguins, which until their first interglacial ease-off must have waddled about without feathers proper, all their lives long moulting from one thick Mesoptile coat into the next, generation after generation. This truly startling picture results from the confusing of generations of feathers, which are ontogenetic items, and stages in the evolution of the plumage, which are phylogenetic conceptions.

Archæopteryx likewise does not fit into this view, with its highly specialised remiges and rectrices, of late Jurassic date, and certainly long before penguins came into existence.

Apropos of the question of the origin of feathers from scales, we are told that the conversion of his Cryptoptiles (consisting apparently of hollow epidermal cones) into the Protoptiles took place "in some incomprehensible way," and that the Protoptiles "in some way soon acquired the chief characteristics of true feathers." Perhaps it was a case of miraculous mutation? But why incomprehensible, considering that there are at least two reasonable possible explanations, the only difficulty being which to choose. What is less comprehensible is that the author did not refer simply to that résumé (itself a large essay) by that experienced referee Prof. Keibel, in "Ergebnisse . . ." 1896, supplemented more recently by Schleidt (1913) and Steiner (1918), who adds a literature list well-nigh complete and appalling by its size.

H. F. G.

The Advance of Heliotherapy.

By DR. C. W. SALEEBY.

THE treatment of disease by sunlight is the newest of old things. It was systematically practised by Hippocrates, the Father of Medicine, and perhaps we need not trouble ourselves with questions of priority in our own times. At any rate, the first clinic for the heliotherapy of surgical tuberculosis was opened by Dr. A. Rollier at Leysin in 1903, and at last it would appear that his methods are to be followed throughout the world. Already in France and Italy the sun cure is practised, and I recorded lately in NATURE (March 2) the finding of many heliotherapeutic institutions on the Riviera, from Cannes to San Remo. The city of Lyons wisely sends its sick children to the Villa Santa Maria at Cannes, and the Italians have recently established the Istituto Elioterapico which I found outside San Remo a few weeks ago. In our own country we have Sir Henry Gauvain at the Treloar Hospital, Alton and Hayling Island, and Dr. Gordon Pugh, at Queen Mary's Hospital for Children at Carshalton. In the United States, Rollier is being followed at Perrysburg, near Buffalo.

Now there comes an admirable volume¹ which clearly presages the advance of heliotherapy into Spain. The number of the journal in question is devoted to a series of articles in Spanish by Dr. Rollier and his assistants at Leysin. First of these is a paper by Dr. Rosselet, a physicist, on the scientific bases of heliotherapy, and Dr. Amstad contributes a paper on the sun cure of non-tuberculous diseases. We shall do well not to associate the sun cure exclusively with tuberculosis nor solely with the proved antiseptic power of sunlight. The recent American work, both at Columbia University and Johns Hopkins Hospital, has shown that sunlight has potent influences upon nutrition and metabolism, and is capable, for instance, of preventing and curing rickets in a fashion hitherto unsuspected. Amstad refers to rickets, of course, but he is evidently not acquainted with this new American work.

The publication is completed with a series of well-produced plates which illustrate Rollier's methods and show, in several "before and after" photographs,

the all but miraculous results which he habitually obtains.

Madrid, like Munich and Mexico City, is a city which teaches us that abundant tuberculosis may occur even at high altitudes. Even "Sunny Spain" needs the lessons of heliotherapy. At Mentone, a few weeks ago, myself in broad and ravishing sunlight, I saw a cobbler at work in a dark room, lit by a miserable oil-lamp, the rays of which ill served to illuminate his work. Answers of this order serve as reply to those who ask why, for instance, if the sun be such a preventive, there is any tuberculosis in India.

In his fine article in this present publication, Dr. Rollier insists, as ever, upon the superior value of the early morning sun. This point needs perpetually to be made. We tend to associate light and heat; so that, last year, the late Prof. Benjamin Moore actually asked, in the *Times*, whether "too much light and heat" may not be bad for us. The question is illegitimate. Light and heat must be distinguished. In Canada, according to my own observation there, it is the combination of light and cold that contributes to the superb Canadian physique and vitality. In Switzerland the same is true, and Leonard Hill has shown us the physiological basis of this valuable combination. But when thoughtless clinicians expose cases of pulmonary tuberculosis, for instance, to sunlight in warm weather, perhaps in the afternoon, perhaps even with exposure of the chest, and achieve only fever and hæmorrhage for their unfortunate patients, we are told that heliotherapy is useless in phthisis.

It is certainly high time that the fundamentals of the biology and physiology of light should be well and truly laid. Dr. Rosselet, in his interesting contribution, does not convince us that any one, as yet, really knows how sunlight achieves its results, but we shall expect to place heliotherapy upon broad and deep foundations when the committee lately appointed by the Medical Research Council gets to work. Meanwhile we must hope for English translations of "La Cure de Soleil" and the rest of Rollier's works, so that the present tragic farce of the treatment of tuberculosis in this country, with its desolating results, may yield to the intelligent use of sunlight.

¹ Archivos Españoles de Tisiología, Num. 4. (Enero 1922, vol. 2. Barcelona, Calle de Aragon, núm. 282.)