little. Each addition to the neck so acquired was transmitted to the descendant, and by accumulation of the changes thus produced the modern long-necked condition was attained. According to Weismann, what happens is this. In each generation slight variations in the length of the neck, as in the other parts of the body, occur. These variations are due to constitutional causes which are transmitted. When greater length of neck became important to the animal, those animals with necks a little longer or capable of being stretched out a little further, would have the advantage, would survive longer, and leave more offspring. The offspring, inheriting the constitution of their parents, would inherit this tendency to have longer necks. By the continual elimination in many generations of the short-necked forms, and by the seizing hold of each naturally-occurring variation, the long-necked condition would finally appear.

As variations are constantly occurring, natural selection must constantly be at work to maintain the standard of any organ. Whenever an organ ceases to be of use, or even when it becomes merely of subordinate utility, this selective maintenance falls into abeyance. A state that Weismann calls *Panmixia* results. Variations below the standard cease to be eliminated, and the organ slowly degenerates. In this way is explained degeneration through disuse: degeneration from conditions that are not harmful but merely unnecessary. In many cases organs that are not used degenerate very much during individual lives, but this occurs through failure of nutrition. Weismann believes such effects not to be transmitted. Were these effects inherited, useless organs must inevitably disappear very much more rapidly and completely than there is evidence for.

Instincts are elaborated, not by the accumulation of transmitted individual experience, but by continual selection of mental variations in the required direction. For instance, the instinct to avoid enemies arose not by accumulation of experience, for experience of the inconvenience of being devoured could hardly be transmitted, but by the naturally more timid forms surviving, and leaving more offspring than their less wary brethren.

Talent and even genius often run through several generations; and certainly mental powers can be much increased in individual lives. But the exhibition of talent and genius depends on a combination of many physical and mental conditions in which constitutional variation is ever present, and these variations are undoubtedly inheritable. Moreover, the history of families of conspicuous ability (as, for instance, that of the musical family Bach) shows that the highest development often occurs in the middle of the series, while the theory of the transmission of acquired characters would demand to find it at the end.

Selection of variations best explains cases of adaptation to new climates. But the immense influence of climate conditions on nutrition in each ontogeny must be taken into account.

Qualitative changes at first present some difficulty, but it must be remembered that qualitative changes are nearly always at bottom quantitative. A surface appears naked, though covered with many small hairs; or light-coloured, though scattered pigment-cells are present. Quantitative variations in such conditions certainly occur, and are certainly transmitted, and natural selection can readily change the number or size of hairs or pigment-cells, and produce so-called qualitative results.

It is not claimed as yet that the inheritance of acquired characters can be excluded in every case. But increasing knowledge of the conditions of life and of the functions of organs causes ever a larger and larger part of the phenomena of the organic world to be explained by the selection of naturally-arising variations.

P. CHALMERS MITCHELL.

IMPERIAL GEOLOGICAL UNION.

REFERRING to my letter on the above subject, published in NATURE, vol. xxxvi. p. 146, I beg to communicate, for the information of those interested in the matter, the substance of a report made to the Royal Society of Canada at its meeting on May 22, in Ottawa.

The Committee reported that it had, as directed, printed the letter of Sir William Dawson to the President of the Royal Society, and the first report of the Committee, and had circulated these extensively, sending them especially to geologists and Societies in Great Britain and the colonies and dependencies of the Empire. A large number of replies had been received, testifying to a somewhat general wish for union and co-operation.

The matter was then laid before the Council of the Royal Society, with the view of holding a Conference in London under its auspices. The subject was taken up by the Council in October last, and a resolution was passed and communicated to the Committee to the effect that, having regard to the existing condition of the question of scientific federation, and the various contingencies that may occur during the next few years, they do not see their way to summon such a Conference as that recommended.

In view of this resolution it was felt to be useless for the present to attempt any farther action. Still, as the desire for and appreciation of the benefits of the union contemplated seemed to be very general, and as opportunities may occur later for giving it a practical form, it was thought best by the Royal Society of Canada to continue its Committee, with power to correspond with other bodies and with persons interested. The undersigned will therefore be glad to receive any communications on the subject.

Some misconception appears to exist as to the relations of the intended movement to the International Geological Congress which is to meet in London in September next. They have in reality no connection, except that, under certain contingencies, they might be mutually helpful.

A Union of British Geologists might exercise an influence for good in connection with the plans for unification of classification, nomenclature, and mapping, which have occupied the attention of the Congress; but its function would rather be the positive one of uniting workers throughout the wide area occupied by the British Empire, and enabling them more effectually to co-operate in the extension of actual knowledge, in giving mutual aid, in enlarging the mental vision of local and special workers, in making accessible to isolated labourers the common stock of knowledge, and in preventing the interference and discordance which result from disunited effort.

That there are difficulties in the way of the realization of such a plan as applied to British and colonial geologists in the first instance, and ultimately to all English-speaking geologists, there can be no doubt; but they are continually diminishing, in consequence of greater facilities for intercourse and the rapid growth of scientific work in the various outlying parts of the Empire. The idea is thus a fruitful one, certain to be realized in the future; and possible even at present if a central nucleus could be secured for an Imperial organization. It is not impossible that the large gathering of English-speaking geologists in London in September may afford opportunity for further discussion of the plan; and if the invitation which it is understood will be given by our friends of the United States to hold the next meeting in America be accepted, this may constitute another step in the same direction.

Montreal, May 31.

J. WM. DAWSON.