SCIENCE.

Mental Evolution in Animals. By G. J. Romanes. With a Posthumous Essay on Instinct, by Charles Darwin. (Kegan Paul, Trench, & Co.)

In this volume Mr. Romanes begins his self-imposed task of tracing out the history of mental evolution, and gives a brief sketch of the probable course of that evolution in the lower animals. Already, in his work on *Animal Intelligence*, he had collected a large mass of data for such a theoretical interpretation; and in a future treatise on Mental Evolution in Man he hopes to continue his line of argument to its logical conclusion. As a whole, the very difficult and delicate problem he has set before himself has been treated here with wide knowledge, with great originality, and, above all, with that union of scientific method to subtle philosophical and psychological acumen which forms, perhaps, the most characteristic feature in the author's mind. Mr. Romanes, in fact, is the philosopher among biologists, and the biologist among philosophers, preserving the balance between his two lines of study with such remarkable impartiality that no scientific man can afford to disregard his science, and no psychologist to disregard his psychology.

Beginning by positing as the criterion of mind, viewed as an eject (to borrow Clifford's admirable word), the manifestation of Choice, Mr. Romanes passes on to a consideration of the objective conditions under which alone mind is known to occur—namely, in connexion with nerve-tissue, upon whose functions and origin his own investigations into the nervous system of medusae have thrown considerable light. He concludes that the directing or centralising function of ganglia has probably in all cases been due, as Mr. Spencer has argued, to the principle of use, but combined with natural selection. In tracing the onward development of mind, Mr. Romanes makes large use of a sort of chart which he has designed, and which ingeniously represents at a single *coup d'œil* the relative height in intellectual and emotional development reached by each great group of animals, correlating with these, at the same time, the corresponding levels of the human infant. He proceeds to consider the origin of consciousness, sensation, pleasures and pains, memory, and association of ideas. Unfortunately, the treatment of all these subjects is too minutely analytical to admit of being adequately treated in any *résumé* for which space would be possible here; and, indeed, this difficulty meets one at each stage in an attempt to criticise the entire book. Every chapter is so full of moot points, and the solutions suggested are so delicately and carefully put, that it would be an injustice to state any of them in a naked form without the reservations and explanations by which they are so cautiously and philosophically limited. The book, in fact, is so closely reasoned from beginning to end that a short summary could only result in misleading the reader as to the real nature of the contents. It is the detailed and accurate application of observed facts to a psychological evolutionary scheme that constitutes the main novelty of Mr. Romanes' treatment; and this element can only be appreciated by reading the treatise at large,

Where others have had to deal mainly in conjecture, he has endeavoured instead to base his arguments upon ascertained fact. Especially interesting in such respect are the experiments collected in the excellent chapter on "Perception," and the observations on dogs and other animals quoted in that on "Imagination."

By far the larger part of the volume, however, is taken up with the consideration of Instinct, which may be regarded as the central crux and main problem of animal psychology. Defining instinct as "reflex action into which there is imported the element of consciousness," Mr. Romanes proceeds to discuss the radically opposing views of Lewes and Spencer, and the intermediate, or, to some extent, conciliatory, theory set forth by Darwin. Of these, it may fairly be said that Lewes's falls short because, in spite of its author's wide adaptability, he failed in later life fully to assimilate or at least to follow out to their farthest consequences the Darwinian doctrines which he accepted passively in the lump. The question between the two remaining theories may still be regarded as one of the most burning among biological psychologists. Mr. Romanes, on the whole, defends and expounds the pure Darwinian thesis of the twofold alternative origin of instinct, either, on the one hand, from natural selection (or survival of the fittest) continuously preserving actions which, though never intelligent, yet happen to have been of benefit to the animals which first chanced to perform them; or, on the other hand, from actions originally intelligent becoming, through the effects of habit in successive generations, stereotyped into permanent practices. For these two principles in their joint action he fights steadily all along the line, point by point, with his usual dialectical skill, and with great command of facts and illustrations. Setting out with a deliberate list of the various propositions which must be severally established in order to prove that some instincts have had the first-named origin (such as, that non-intelligent, non-adaptive habits occur in individuals; that such habits may be inherited; that they may vary; and so forth), he goes on to produce inductive proof of each in order, till he arrives at his final conclusion. He then applies a similar course of set argument to the various propositions needful for the establishment of the second alternative origin of instincts. All this part of the work is set forth with a formal completeness which aims at something approaching almost to mathematical rigour. Thence Mr. Romanes endeavours to show that instincts may also have what he calls a blended origin—that intelligent adjustment, going hand in hand with natural selection, can greatly assist it by supplying as its groundwork variations of habit which are not fortuitous, but are from the first consciously adaptive. The chapter dealing with this special modification of the instinct-forming principle is particularly rich in apposite and well-chosen examples. Even more subtle is the one which treats of the modes whereby intelligence determines the variation of instinct in definite lines. The particular stumbling-blocks of all theories of instinct—the self-immolation of moths and lemmings, the migrations of birds, feigning death, and the instincts of neuter insects—are all passed in review with much ingenuity, though not always with any very conclusive result. The bee puzzle, in particular, still remains just as absolute a stumbling-block as Darwin left it. We may have faith that natural selection, exerted upon communities, and upon queen-bees through them, might thus suffice to remove mountains; but faith alone is a poor substitute for conceivable and realisable steps in such a matter. However, we must not find fault with Mr. Romanes because he has not succeeded in casting any fresh light upon the most confessedly obscure of all these exceptional cases. Doubtless some day somebody will hit upon the exact missing conception which will enable us to bridge over the now impassable gulf. But this kind cometh not forth of study or deliberate thought; it flashes accidentally, as it were, some fine morning across minds of a very peculiar type, like Oken's or Mr. Wallace's, aroused at the moment by the unexpected clue spontaneously afforded in some passing analogy.

Mr. Romanes' book is one that will need no recommendation to all psychologists of the new school; and it is to be hoped that its lucid style and literary excellence of execution will induce many of the old school also to take it into their favourable consideration. They will find it commendably free from unnecessary technical terminology, and pleasantly written from beginning to end.

GRANT ALLEN.

CORRESPONDENCE.

"ANTIMONY."

London: Feb. 16, 1884.

The Arabic name of this metal, or rather of its sulphuret, is *ithmid* (*al-ithmid*, with the article); *στίμμι, στίμμις, στίβι*, in Greek; *stibium*, in Latin; *antimonio*, in Italian, Spanish, and Portuguese; *antimoine*, in French. Another Spanish old alchemic word, *alcimod* or *alcimud* (pronounced *althimod*, *althimood*, with the voiceless *th*), although very different at the first glance from *antimonio*, seems, however, to be the connecting link between this last and the articulated Arabic word. Littré seems inclined to derive the Low-Latin *antimonium* from the Arabic *uthmud* or *ithmid*, and Devic limits himself to calling this derivation "not impossible." In the Spanish *antimonio* I see no other element derived from Latin but the termination *io* from *ium*, and this on account of the Arabic origin of alchemy introduced into Spain with the word *al-ithmid*, changed by metathesis first into *althimid* and afterwards into the Spanish *althimod* and *antimonio*. The change of *d* into *n*, both alveolar sounds, particularly in such an un-Spanish termination as *od*, is no matter of surprise; and one ought to be even less surprised at either the permanence of the Arabic *th*, as in *althimod*, or its change into *t*, as in *antimonio*. In fact (see Dozy's *Glossaire*, &c., p. 20 of the second edition), just in the same way as the Arabic *th* in *thagr* gives rise both to Spanish *z*, pronounced *th* in *zegri*, and to Spanish *t* in *tagarino* "Moor who lived among the Christians, and by speaking their language well, could scarcely be known," so the Arabic *th* in *al-ithmid* gives rise to Spanish *z*, pronounced *th* in *alcimod*, and to Spanish *t* in *antimonio*. Nor is the second *i* in *al-ithmid* less reducible to the first *o* in *alcimod* and *antimonio*. Compare only, among many other words, the Arabic *al-mikhadda* and the Spanish *almohada*, "pillow." With regard to *l* in *al-ithmid*, as Prof. Rieu has kindly observed to me, the group *anti* is more familiar to Latin