

author is really seeking the truth, and not a mere gladiatorial victory or scoring of points.

The section most interesting to scientific workers is that in which the author discusses vitalism and the relation of mind to body. Quoting Bergson, Ward, and Taylor, he expresses disapprobation of the theory of "guidance." On this theory, mind and its world, choice and action, become "utterly discontinuous." The choosing unit or element is not a system of the contents dealt with by choice. The "plan" is brought to the material; it is not in it or elicited from it. The view in question is a survival in principle of the notion of matter *plus* miracle—the attitude of common external teleology (p. 205 and foll.). Moreover, there is the difficulty about energy. The guidance theory tries to shade this down by analogies such as the trigger, the ball or water-drop on a high divide, or the spark which explodes the gas in a gas-engine. In these cases a small variation in energy-expenditure may cause huge differences in result. But some expenditure there must be. On the analogy, the mind must furnish energy without participation of the body. "Views of this type only escape manifest conflict with common sense by restricting the amount of energy so furnished to an amount below the possibility of measurement" (xxvi.).

Many readers who have studied with interest and admiration the writings of Driesch, Bergson, and Lodge on this point will feel that Dr. Bosanquet's objection is a formidable one; as is also his criticism of Prof. Bergson's startling contention that contemplative and motor memory are radically different, the former being independent of brain. It is true that these are matters of science, and philosophers must tread warily in the foreign territory; but their outlook is wider—though with less perception of detail near at hand—and their criticism is to be desired and welcomed.

*A Nature Calendar.* By Gilbert White. Edited and with an introduction by Wilfred Mark Webb. Pp. xii+62+xiii-xx. (London: The Selborne Society, 1911.) Price 25s. net.

This beautiful facsimile, published by the Selborne Society, reproduces a record for the year 1766 of botanical observations made chiefly at Selborne, with an occasional note on birds or insects. This record, of which the MS. is in the possession of Mr. Webb, has never been before published, and is not to be confused with the so-called "Naturalist's Calendar," often printed at the end of the "Natural History of Selborne." The printing, paper, and binding of this large volume are all admirable, and the brief introduction is adequate; it is a superb volume to lie on a drawing-room table and be admired by the chance visitor, who will, it may be hoped, at least be struck by the strong, firm, and legible handwriting of the famous naturalist. White himself would be amazed at the magnificent dress in which his humble notes were destined eventually to appear; no man could know better than he that in no sense whatever could they form even the material for a book. Yet Mr. Webb claims that "now after an interval of a hundred and twenty-three years a second book makes its appearance in the shape of the present volume." White published but one book, and that an incomparable one. Mr. Webb publishes for him a second one, under the auspices of the Selborne Society. Making all allowance for enthusiasm, and for the carefulness of the editing (of which the excellent index is perhaps the best part), those who know how real books can only be built up on a foundation of lengthy studies, and how unwilling an author is to have such studies exposed to the gaze of the curious, will feel some regret that this rather meagre diary should have been thus magnificently produced. W. W. F.

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## LETTERS TO THE EDITOR.

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### Contour Diagrams of Human Crania.

Has not Prof. D'Arcy Thompson got over the "lack of fixity and precision" in the individual judgment involved in superposing two cranial contours by selecting, quite arbitrarily, the vertical axis of the transverse section as the length to be equalised in all such sections? May I suggest that he should try equalising his auricular distances, and taking his percentage differences on the vertical ordinates? I fancy he will then find that the differences in form of two skulls will not even be emphasised at the same places as on his arbitrary scheme.

Again, in the case of the sagittal section, there are at least half-a-dozen fundamental lines any one of which might find justification in individual judgment as a standard for equalising size. A mathematician would probably object to equalising any *lines* at all, but would magnify up all his sections to be of equal *area*. He would then be certain that the total area intercepted between his superposed contours—however placed—was zero. This would certainly mean that on any reasonable superposition the contours would be very close together. In such case for the transverse section, we should all probably superpose the median lines, but, again, whether we should put the vertex on the vertex, or the auricular line on the auricular line, or superpose neither, would be matter for discussion, if not for individual judgment. The width of individual judgment allowed in the case of the sagittal section, having regard to such standard lines as either the "horizontal plane" provides or as join nasion, bregma, lambda, inion, opisthion, and basion, is so great that Prof. D'Arcy Thompson's method would require a cranio-logical concordat before it could be put into practical form, even supposing we could agree on what should in this case be the "area" of the section.

Still another group of investigators might consider it desirable to equalise, before superposition, not any arbitrary lines or much more definite areas, but the *volumes* of the two type crania as determined, say, by average capacities or by the product, perhaps, of three arbitrary diameters. Be this as it may, either an equalisation of areas or of volumes seems to me a more reasonable preliminary to comparison of form than any equalisation of an arbitrary line. Yet such equalisations will also leave a "lack of fixity and precision" in our results. We wish to test how far our contours are similar and similarly placed curves; we ought to bring something approaching a "centre of similitude" into superposition in both contours; the orientation in the case of the transverse and horizontal sections will present no difficulty—in the case of the sagittal it is much more questionable. The mathematician would possibly select as his centres for testing similitude the centroids of either the contours or of their areas—if he were equalising areas, probably the latter.

I would therefore suggest as a method to be compared with Prof. D'Arcy Thompson's results, say, in the first place, for the transverse contours:—(1) the equalisation of areas; (2) the superposition of centroids of areas; (3) the orientation by parallelism of median lines; (4) the comparison along rays through this centroid. Thus the contours themselves would be directly compared, and not auxiliary curves. Lastly, if the superposed contours be divided into equal *angular* elements  $\sigma$ , and  $\nu$  be the mid-distance of any element of the first contour from the common centroid,  $\nu'$  the distance along the same ray to the compared contour, then

$$m = S \left\{ \left( \frac{\nu' - \nu}{\nu' + \nu} \right)^2 \sigma \right\} / S'(\sigma),$$

where S denotes a summation for every element, would be a fit measure of the degree of resemblance.

Possibly some mathematician may be willing to undertake the general theorem: Given two oval curves, the shape of which must not be changed (but size is change-