tion on page 148. It should not be forgotten that the nervous character of the so-called thalamic nerve (mentioned on p. 184) has never been demonstrated, nor is it so certain that "the eye grows out from the dorsal zone of the forebrain" since that depends upon what is taken to be the morphological anterior end of the brain.

Is the conclusion (p. 191) justified that "since the vagus is a cranial nerve, its distribution to heart, stomach and lungs, shows that these structures belong to the head"? Possibly they do, but by the same token so does the tail belong to the head since this also is innervated by a branch (N. lateralis) of the vagus. In the light of what we now know regarding nerve histogenesis is it not time that the dogma of a primary, unalterable connection between nerve and its terminal organ were abandoned? Fats are spoken of (p. 220) as "hydrocarbons," although the term is used by organic chemists only in reference to oxygen-free carbon compounds. Considering the scope of the book, however, such exceptional errors are not surprising. In a field where the possibilities of divergent opinion are so many it is remarkable that the book contains so few statements to which exception may be taken.

Numerous illustrations, mostly from original sources, constitute one of the most distinctive features of the book. The unusual skill of the author as an artist is shown especially in the admirable stereograms scattered through the book, which in this respect makes another real contribution to the pedagogy of comparative anatomy. The outline drawings, however, are not always easily analyzed by the eye and might be improved by more contrast. The addition of a diagram to illustrate some of the more important fiber tracts of the vertebrate (Mammalian?) brain would aid the description on page 153. A few errors of labelling persist in the second edition. The numbers of the first and second head cavities are interchanged in Fig. 270. In Fig. 336 the right and left post-cardinals are incorrectly labelled as "post-cavæ." In Fig. 378 the two oviducts are shown as uniting in a "urinary bladder." Some typographical errors there are of course. The book as a whole however, is one in which American morphologists may take just pride as an admirable piece of work by an American zoologist of distinction aided by an American publisher of high ideals of typographic workmanship.

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A Year of Costa Rican Natural History. By AMELIA S. CALVERT and PHILIP P. CALVERT.

The chief object in the visit of these two entomologists to Costa Rica was a study of the dragonflies with special reference to their life-histories and seasonal distribution. However, in the preface, we are told: "Our investigations have not yet been completed and we have little to say in these pages on that technical subject. What we here set forth are chiefly our more incidental observations recorded in our diary." The first point made by the authors is in regard to the changes which will be induced by the Panama Canal. We are given no hint of the factors productive of such changes or of their nature or extent. But in view of the expectations of such transformations, it is a pity that a delay of about eight years has intervened between the expedition and this publication of the general résumé of its results.

The authors have shown wisdom in rewriting their notes and doing away with any diary form. They have grouped their observations geographically and when several separate visits were made to any one place, these are grouped in a single chapter. As the five hundred pages of text deal chiefly with disconnected, casual notes, with annotated facts and identifications, it is impossible to offer anything like a detailed criticism. The excellent index places this information in a form readily available for reference. The volume is filled with interesting matter and adumbrates what must be the all-important scientific work of the future—the direct correlation of field work with that of the laboratory and museum. As we might expect, the chief interest was insects, although plants form a close second in

amount of space. In the case of the latter, many photographs aid in familiarizing the reader with the forms of flowers and foliage. Notes on mammals and birds are almost absent. A single instance of a bird feeding upon lepidoptera was noticed. On the other hand, copious notes were made on the natives, their customs, mode of life, houses and villages. But the matter relating to dragonflies, the discovery of the various forms and the rearing of their larvæ, stand out from all the rest of the text. In dealing with this phase of research, the enthusiasm is distinctly greater, the diction more pleasing, and the treatment more thorough.

The text presents many readable descriptions of scenery and of unexpected conditions in this tropical country. Such a one is the strawberry field with its amazing amount of delicious fruit, shaded by tall rose trees. And the last chapter has a most vivid narrative of a disastrous earthquake in which the whole city of Cartago was ruined and several hundred people killed. The authors fortunately escaped with their notes and photographs. They go on to recount: "The falling wall carried with it the tumbler shelf so that the larvæ, the rearings of many months, were all killed—with one extraordinary exception. A bottle of new *Cora* larvæ which P. brought with him the evening before from Juan Vinas —the rarest thing we had—was found on the floor, unbroken and with the larvæ alive!"

In addition to the well-made index there are several appendices dealing with the itinerary, temperature and rainfall records, a summary of papers published in connection with the collections made on the trip, and a systematic list of plants and animals mentioned. As this latter has the page references, the contents of the volume are thus made still more available for reference. The authors are to be sincerely congratulated on having saved their incidental notes and observations from oblivion. Such work can not fail to add to any breadth of generalizations in their own more narrow field of special, intensive work, and sets a standard for other expeditions which it is hoped will often be equalled or surpassed. "The Voyage of the Beagle" is bearing late fruit and should be a stimulus to all such effort in the future.

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SPECIAL ARTICLES

THE EFFECT OF OMNIVOROUS AND VEGETARIAN DIETS ON REPRODUCTION IN THE ALBINO RAT

AN experiment, now in its fifth year, is being carried on to show the effect of a vegetarian diet as compared to an omnivorous diet on reproduction in the albino rat in regard to:

1. The relative number of litters produced.
2. The relative number in the litter.
3. The relative frequency of producing litters.
4. The relative ratio of the sexes.
5. The relative vitality and growth of the young.
6. The relative longevity and general appearance.
7. The relative age at which breeding begins and ceases.
8. The general effect upon successive generations.
9. Sterility test; to determine whether it is the male or the female which is rendered impotent.

The number of pairs constantly under observation was 40. Approximately 20 of these pairs were restricted to a vegetarian diet and the remaining, used for control, were given the same vegetables with some form of animal food added. As soon as one of a pair died the other was remated. Or when they became too old to breed they were discarded and the cage restocked.

The results and conclusions so far reached may be summarized as follows:

If only those pairs which produce litters are taken into consideration the average number of litters per pair for the omnivorous group is 3.73 and for the vegetarian, 1.93. But when the whole group of matings are considered we find that 11.5 per cent. of the omnivorous and 55.9 per cent of the vegetarian pairs failed to reproduce. If these are considered, the average number of litters is