ception, and takes up the argument as follows: "Now, it may be asked whether all this analogical extension of imagery to what seem to us such incongruous objects involves a vivid and illusory apprehension of these as transformed. * * * A conjectural answer can be given. In this imaginative contemplation of things the child but half observes what is present to his eyes, one or two points only of supreme interest in the visible thing, whether those of form, as in assimilating the piano-hammer to the owl, or of action as the *falling* of the leaf, being selectively alluded to, while assimilative imagination overlaying the visual impression with the image of a similar object does the rest. In this way the actual field of objects is apt to get veiled, transformed by the wizard touch of a lively fancy."

Now, from the standpoint of a certain psychology, the customary one, this is very well said. But it merely assumes, without questioning, two things which the facts discussed are well adapted to make us question: the 'actual field of objects,' 'what is present to the eyes' on one side and the imagination or fancy, as some sort of distinct power on the other. But is not this somewhat naive? Is this reference to the 'actual field of objects' anything more than making the special constructions of the adult consciousness, made from the standpoint of its supreme interests, the fixed standard? Is the problem how and why the child overlays the things present to his eyes with fanciful unrealities one of his own inner being? Or is it why and how the growing consciousness gradually shears down the original experience, inhibiting the larger part of the interests which determined it, and gradually confines itself to one or two definite ends and habits in selecting the qualities which shall constitute the world of things? In a word, is the child object the adult ('or real') object with an overplus of fanciful fringe, or is the adult-object the child-object pared down and rearranged to meet the dominant needs of mature life—one being just as 'real' as the other in an abstract or metaphysical sense?

I do not mean to affirm that Mr. Sully is wrong in choosing the former alternative. But the fact that he has adopted it without considering there is an alternative, indicates to my mind 'that, for the most part, he is just classifying the new scientific material under the old headings, instead of remaking the point of view.

From the standpoint of the scientific psychologist this is an important qualification regarding Mr. Sully's work. Quite probably, however, it fits the book all the better for the task of mediating between the psychologist and the public of parents and teachers into whose hands the book will fall; and, as there are many signs that this is the end the book has in view, it is a pleasure to add that it fulfills this particular purpose better than anything as yet published upon child psychology. A good index adds materially to the usability of the book.

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The Whence and Whither of Man: A brief history of his origin and development through conformity to environment, being the Morse lectures (at Union Theological Seminary) for 1895. By JOHN M. TYLER, Professor of Biology, Amherst College. Charles Scribner's Sons, New York. $1.75.

The Morse lectureship was founded by Prof. S. F. B. Morse in 1865 at Union Theological Seminary, the lectures to deal with 'the relation of the Bible to any of the sciences.' These lectures for 1895, which are just published, deal with some of the most fundamental of all the relations between scientific and religious belief, and that in such a candid and fearless spirit as to at once win the attention and respect of all persons who love the truth and believe that a free expression of opinion is the best way of advancing it. The lectures include such topics as the fundamental properties of living things; a brief consideration of Classification, Ontogeny and Phylogeny; the probable course of evolution from amœba to man; the history of mental development and its sequence of functions from reflex-action to reason and altruism; natural selection and environment, making at first for digestion and reproduction preeminently, then for muscular strength and activity, then for shrewdness, finally for unselfishness and righteousness; conformity to environment; man from the biological, social and religious stand-

point ; finally a chapter on the teachings of the Bible relative to the subject in hand and another on the present aspects of the theory of evolution in which are considered a number of modern theories as to causes of evolution, inheritance and variation.

These lectures present the evolution idea not from the theological, but from the scientific point of view. They are largely biological in content and spirit though addressed to theologists. The author does not attempt to prove everything, but takes many elementary principles for granted, among them the truth of the entire doctrine of evolution. One is consequently spared the weariness of listening to a labored argument to prove the truth of fundamental ideas, which everybody, except a few immutables, believes. On the other hand it presents in a clear and suggestive way many of the more recent developments of the evolution idea. It does not purport to be an original contribution to knowledge, but it is a valuable and extremely well written book of the ' educational ' type.

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SCIENTIFIC JOURNALS.

THE ASTROPHYSICAL JOURNAL, AUGUST.

The New Elements of Clèveite Gas: By J. R. RYDBERG. In referring to the work of Runge Paschen and regarding the reduction of the spectrum of clèveite gas, the writer recalls the following simple law, announced some time ago by himself : *The difference between the common limit of the nebulus and the sharp series, and the limit of the corresponding principal series, gives the wave number of the common first term of the sharp and principal series.* This law holds good to a considerable degree of approximation for the alkali metals Li, Na, K and Rb, which have corresponding triple series, and is proposed as a criterion of the proper *mating* of the subordinate with the principal series. If we denote the principal series by P_1 and P_2 and the subordinate sets by S_1 and S_2, and assume that P_1 belongs with S_1 and P_2 with S_2, the law will hold ; otherwise, in general, it will not.

In the correspondence chosen by Kayser and Runge the criterion is satisfied within the limits of observational error. The values of the first

terms (in wave numbers, per cm.) of the principal series are as follows ɩ

	Computed.	Observed.	C — O = △
Pa	4857.79	4900.65	— 42.86
He	9230.22	8950.14	+280.08

Although the △'s are well within the limits of error for the observation of this first line, which is in the infra-red and must be measured with the bolometer, there is evidence, in the case of He, of a probable disturbance due to the proximity of Na λ 11392.5, the sodium lines being strong in the visible spectrum. The author, therefore, concludes that the computed values of the lines are the most accurate. More accurate determinations of the lines in question will be of extreme value in testing this most interesting law.

Attention is also called to another law due to the writer, which seems to show Parhelium to be of uneven and Helium to be of even valency.

Outlines of a Theory of Spiral and Planetary Nebulæ : By E. J. WILCZYNSKI. 1. A theory to explain the peculiar formation of spiral nebulæ. The writer supposes a mass of nebulous matter to be moving in a circle under the action of a central force. In case the mutual attractions of different parts of the mass upon one another are insufficient to resist distortion, it is shown that the different parts of the mass must be moving in concentric circles, the common center, of course, being the attracting body. Under these conditions it is evident, from Kepler's third law, that those portions of the nebulous mass nearest the center of the circles must rotate faster than those furthest away. In this manner a former radial line in the nebula will be distorted into a spiral.

The writer suggests that this gives us a means of approximating to the age of the nebula (as a spiral).

2. If a nebula has the shape of a flat disc, then the following differential equation exists between ρ, the density at any point, r, the distance of the point from the center, and ω, the angular velocity of the point, where ω and ρ are both supposed to depend only upon r.

$$\frac{d^2\rho}{dr^2} + \frac{1}{r}\frac{d\rho}{dr} - \frac{1}{\rho}\left(\frac{d\rho}{dr}\right)^2 + 4\frac{\pi}{c}\rho^2$$
$$= \frac{\rho}{c}\left(2\,\omega^2 + r\frac{d\omega^2}{dt}\right)$$