of Prof. N. M. Butler, of Columbia College, on November 29th and 30th.

THE Brown University Lecture Association has announced the following courses of free public lectures for the coming season: 'The Religions of China,' by Rev. F. Huberty James, formerly of China; 'Lectures on the History of Song,' by Louis C. Elson, of the *Boston Daily Advertiser*; 'Studies in Social Economics,' by Hon. Carrol D. Wright, Esq., of Washington; 'The Divina Commedia, its Predecessors and Successors,' by Prof. Courtney Langdon, of Brown University. Prof. Charles S. Hastings, Ph.D., of Yale University, will give three lectures upon a subject in physical science to be announced later.

THE calender of the Imperial University of Japan for 1894–95 shows that it ranks among the great universities of the world. All the schools are represented; there are laboratories, hospitals and museums, an astronomical observatory, a seismological observatory, botanic gardens, a marine biological station, etc. The number of students is as follows:

University Hall	94
College of Law	432
College of Medicine	175
College of Engineering	229
College of Literature	179
College of Science	98
College of Agriculture	261
Total	1468

There are fourteen full professors in the college of science, and a majority of those registered in University Hall are engaged in scientific research. A large part of the work accomplished is published in the *Journal of the College of Science*, which maintains a high scientific standard.

DR. STRAHL, of Marburg, has been appointed to the chair of anatomy in the University of Giessen, in succession to Professor Bonnet, and Dr. Charles B. Ball has been appointed regius professor of surgery in the place of the late Sir George Porter in Dublin University.

On November 1st a laboratory for study and research was opened in connection with the school of physicial and industrial chemistry at 42 Rue Lhormond, Paris. By paying a fixed sum monthly to the city anyone desiring to work in this laboratory will have all its facilities at his disposal.

CORRESPONDENCE.

TESTIMONY VERSUS EVIDENCE.

"It is, we are told, the special peculiarity of the devil that he was a liar from the beginning. If we set out in life with pretending to know that which we do not know; with professing to accept for proof evidence which we are well aware is inadequate * * * we are assuredly doing our best to deserve the same character."—Huxley. Essays V., 54.

Some weeks ago (SCIENCE, Oct. 4, 1895, p. 435) I quoted from recent numbers of the journal extracts to the effect that the phenomena of vitality are not 'explicable' in terms of physical matter and mechanical energy, and that some of them, those of consciousness and volition, are 'agencies' and causes of structure.

Since many thoughtful students believe that the facts warrant nothing more than a humble confession of ignorance of these matters, I called upon the learned bodies which have endorsed the utterances which I quoted to publish the evidence that proves them; and I ventured the prediction that the publication of this evidence would render the said learned bodies memorable for all time.

So far as I am informed this proof has not yet been published; but a number of correspondents have used the pages of SCIENCE to discuss my article, which contained the following passage (p. 439): "What can fundamental disagreement among those who speak with authority lead to except disaster? Are we not bound to find first principles which will command the assent of all thinking men?"

Since this correspondence furnishes new evidence of the imperative need for this agreement regarding the foundations of biology I venture to discuss it.

I some time ago (SCIENCE, April 5, 1895, p. 384) expressed my conviction that it is better to be called a vitalist or any other hard name by zealous monists than to be convicted of teaching as proven what we know is not proved; and, so far as I am personally concerned, the only answer I care to give these correspondents is that it is better to be called a 'materialist' or a

'dogmatist' by pious vitalists than to pretend to know what we do not know.

One of these correspondents says (Oct. 18th, p. 521–2) that the opinions I had quoted are a 'scaffolding' which the builder will not confound with his more permanent edifice; and, furthermore, that I fail to discriminate between volition and consciousness, and am no psychologist.

As I plead guilty to this latter charge I gladly take this opportunity to ask the 'Psychologist' a few questions, although I fear lest, in my ignorance, I may be like the patient who endows his wise old family doctor with more power than he really possesses.

Will the 'Psychologist' tell me, in the first place, how any one who does not use the words in a Pickwickian sense can affirm that "when the protozoa *seek* oxygen they have to be *aware* that they *need* it, and must have some *knowledge* of the fact when they get it," without believing that the said protozoa are both conscious and endowed with volition?

I am greatly surprised to find in the same communication (p. 522) the statement that "every naturalist knows that consciousness is a property of protoplasm."

If I were to disclaim any knowledge of this sort I should, no doubt, be told I am no naturalist, but I think no one will make this reply to Huxley, who tells us "We may all have our opinions as to whether mental phenomena have a substratum distinct from that which is assumed to underlie material phenomena or not, though if any one thinks he has demonstrative evidence * * all I can say is, his notion of demonstrative evidence differs from mine."

I have myself been somewat disturbed in mind by the thought that, while we are bound to find just principles which will command the assent of all thinking men, no less than three mutually exclusive opinions on this matter are current among naturalists. Is it possible that the correspondent holds that these three are one; or is the statement that 'every naturalist knows' so and so only a 'scaffolding,' to be torn down when the writer sees fit?

Without dwelling on this point I wish to ask the 'Psychologist' how, if consciousness is a 'property,' a 'conscious state' can be an 'agency.' Can the writer mean that it is the 'state' and not the consciousness which is the 'agency,' or how does the 'Psychologist' interpret these hard sayings?'

The writer seems to me to be undertaking a difficult feat, which I shall watch with some excitement—the attempt to ride at the same time the most rampant steeds of both materialists and vitalists.

This correspondent attempts to emend my request for evidence that consciousness and volition can cause structure or anything else, by substituting for the words 'anything else' a specific case (p. 522). I therefore ask the 'Psychologist' whether this concrete statement of the problem of volition makes it any easier to solve.

My modest request for evidence that consciousness and volition can cause anything is more roughly handled by another correspondent (P. 554), who attributes to me, in quotation marks, the assertion that 'consciousness and volition cannot cause structure or anything else.'

This correspondent fills two pages of SCIENCE with an accusation of dogmatism, which would be no more than my just due if I had ever made the statement which he so skilfully constructs out of my words.

We are told that it is a maxim for practice in certain circles to ignore all your opponent says, and to answer what he does not say; but this style of reasoning is no ornament to the pages of a scientific journal, least of all one which had already printed and might have verified the statement which is misquoted.

In the article to which these correspondents refer I insisted that the test of truth is evidence and not conceivability; and I illustrated, by the inversion of the retinal image, the fact that evidence may furnish conclusive proof of truths which are inconceivable.

The question whether this illustration is well chosen or ill chosen has, of course, no bearing upon the accuracy of the general statement, and it seems to me that attention has been directed from the main issue by the comments which have been made upon the illustration, al-

though I cannot admit that this was an unhappy selection.

To the correspondent who asks me (p. 287) why I cannot conceive that the image on my retina is upside down, I can give no answer except that I am made so, although I admit that I have no right to speak for others, and that I should not have used the editorial *we* in the statement referred to.

I find many of the truths of science inconceivable, and while my intellect apprehends the logic of the evidence that the sun is more than a million times as big as the earth, I am absolutely unable to conceive this stupendous fact, or to reconcile it with my experience.

It seems to me that my *con*ceptions of nature are pretty strictly regulated by my *per*ceptions; and, while I have no desire to measure the minds of others by my own limited powers, I must ask the 'Psychologist' whether this correspondent has not failed to discriminate between apprehension of the evidence for a fact, and conception of the fact itself.

While I suppose every one admits that knowledge of the chemistry and physics of the organism is a necessary condition for progress in biology, I hope Professor Gage will improve every fitting occasion to tell the 'mechanical physiologists' that the problems of life are not yet reduced to physics and chemistry, and that consciousness is not yet proved to be 'a property of protoplasm.'

I shall gladly second him to the best of my ability as often as he insists that no progress in our knowledge of vital actions can be hoped for unless the organic machine is studied as a living being; but I must point out the fact that none of the passages he quotes (p. 590) have any bearing whatever on the problem of the origin of vital phenomena except so far as they show that it is as yet unsolved. This is a very different matter from proof that the problem is insoluble; and a schoolboy who believes that what his teacher has not yet explained is 'not explicable' may be making a most grievous blunder.

We are all of us schoolboys in knowledge of nature, and our admission of ignorance is not dogmatism but caution. I, for one, do not dare to say any natural event is 'not explicable' by means of the data of physical science; although I am sure all who have studied with me will confirm my statement that I have neglected no opportunity to insist that we have not yet made the slightest approximation to such an explanation of the phenomena of life.

I am, however, equally confident that I know of no approximation to any other explanation; nor do I believe that any one has any moral right to believe in one unless he is prepared to give evidence for it.

W. K. BROOKS.

BALTIMORE, November 19, 1895.

SCIENTIFIC LITERATURE.

Minerals and How to Study Them. A book for beginners in Mineralogy. By EDWARD S. DANA. 12mo, 380 pp. 319 figures.

This elementary book is especially welcome, as for a long time the need has been felt of such a work, by those who are commencing the study of mineralogy. For a full and proper understanding of the science there is needed a knowledge of chemistry, crystallography and physics, and to present the subject, therefore, so that it can be comprehended by beginners is not an easy matter. The books that have previously been available have either been so elementary that the science was not presented with sufficient clearness, or so technical and diffuse that beginners were almost discouraged in trying to become acquainted with the important facts of the science. One of the chief features of this new book is that the author has constantly kept in mind that the subject is being presented to beginners, the use of technical terms has, therefore, been wisely avoided and the subject-matter throughout the book is *readable.*

The first two short chapters are devoted to definitions and descriptions of the occurrence of minerals, and some hints as to how to study and collect them. The third chapter treats of crystallography and structure. The former is treated in a very elementary manner, the difficult mathematical relations are not gone into at all, and only the chief features and peculiarities of the six systems are given. The subject is illustrated not only by outline figures, such as one ordinarily sees in mineralogies, but also by some very excellent wood cuts illustrating pe-