in my paper (*Phil. Mag.*, December, 1913) would be capable of emitting similar series. This atom can be shortly described as a rotating Thomson atom, capable of executing elastic vibrations. If the negative electron is constrained to remain on the surface of a sphere of radius r within the atom (radius a), it will have a frequency ν given by the formula $\nu=A-N(r/a)^2$, where A depends on the boundary conditions, and the homogeneous radiation emitted will be of amount $h\nu$, where h is the quantum constant.

Reasons are given in the paper for showing that if the atom were executing radial vibrations the electron would be imprisoned on a nodal sphere and usually on the smallest nodal sphere of a given mode. Thus if the radii of the nodal spheres were given by the formula $r=a(n/m)$, where n and m are integers ($n<m$), then in the formula for r we take for a series $n=1$ and $m=3, 4, 5, \ldots$. For the enhanced spectra it is only necessary to suppose that the electrons may be on the second nodal sphere of each mode, *i.e.* putting $n=2$.

ARTHUR W. CONWAY.

Elsinore, Dalkey, Co. Dublin, October 1.

Theodore Schwann and the University of Louvain.

IT might not be altogether inappropriate at this time when the world of true culture is grieving inconsolably over the destruction of the University of Louvain, to be reminded that the originator of the famous cell-theory, Theodore Schwann (1810–82), was for nine years a professor at that University. To biologists this fact is probably the most interesting association which the mention of Louvain arouses. Schwann went to Louvain as professor of anatomy in 1838, and left it for a chair at Liège in 1847. It was in 1839 that he gave to the world the cell-theory in a treatise, "Microscopical Researches into the Accordance in the Structure and Growth of Animals and Plants," as the title runs in the translation made by Henry Smith in 1847 for the Sydenham Society.

This great generalisation was made public, therefore, while Schwann was in his chair at Louvain. It is perhaps not so well known that after he had been seven years at Liège, he invented a self-contained respiration apparatus in which carbon dioxide was absorbed and oxygen liberated. It was the precursor of the rescue apparatus so much used in coal mines at the present day, for Hales's apparatus (1726) was too crude to have been of any real value.

It is interesting to know now that, through a crime no expiation can ever atone, the University of Louvain is no more than a memory, its name will be associated with one of the most far-reaching generalisations ever made in the nature of living things—the cell-theory of Schwann of Louvain.

D. FRASER HARRIS.

Dalhousie University, Halifax, N.S.,
September 18.

Filtering Power of Sand.

To those who wish to repeat the experiments on the filtering power of sand, mentioned by Prof. Trouton at the recent meeting of the British Association, I would strongly recommend a solution of the aniline colour known as "Nachtblau." A strongly coloured solution of this substance passed through Fontainebleau sand issues from it absolutely colourless for a much longer time than does that of potassic permanganate.

C. J. WATSON.

The Midland Institute, Birmingham, October 1.

FLIGHT OBSERVATIONS IN INDIA.[1]

VARIOUS theories have been proposed by different writers to account for the fact that birds are able, in certain countries, to remain suspended or even rise in the air without any apparent exertion and without flapping their wings. This action appears to have become known as "soaring flight," notwithstanding the fact that in two English dictionaries now before us the verb "soar" is defined as meaning to rise in the air, without any reference to the means adopted. On the other hand, the action in question does not necessarily imply rising, but it may exist equally when a bird maintains the same level for an indefinite time. We prefer to describe this action as "sailing flight."

Now while writers innumerable have attempted to offer explanations of this apparently paradoxical phenomenon, very little has been done to obtain systematic records, extending over long periods, of the conditions under which soaring or sailing flight takes place. This is probably due to the fact that in northern Europe, where most scientific work is done, sailing flight rarely occurs. During his residence at Agra, Dr. Hankin has had specially favourable opportunities for observing large birds in sailing flight, and his present record of observations should do much to systematise our knowledge of the subject.

The principal birds which figure in Dr. Hankin's observations are as follows:—

	Span in feet.	Load in lb. per square foot
Cheel (*Milvus govinda*)	4	... 0·55
Scavenger (*Neophron gingianus*)	5	... 0·87
Common Vulture (*Pseudogyps bengalensis*)	7	... 1·13
Black Vulture (*Otogyps calvus*)	6·5	... 1·23
Adjutant (*Leptoptilus dubius*) ...	9–11	... 1·54

Dr. Hankin distinguishes a number of different sailing actions, some of them continuous, others alternating with flappings of the wings. These he designates by such names as ease circling, flap circling, flap gliding, flex gliding. A large portion of the book is occupied with illustrated descriptions of the positions of the wings, tail, and body in different kinds of flapping and sailing flight (*cf.* Figs. 1, 2, 3).

The principal theories that have hitherto been advanced attribute sailing flight to irregularities in wind velocity (*cf.* Langley's "Internal Work of the Wind") or upward air currents (Maxim and others). Dr. Hankin attempts to prove that neither of these causes is sufficient to account for the phenomena as they occur in India, and that the explanation must be sought in some other unknown cause. In particular he uses the term "soarability" to designate the state of the atmosphere when sailing flight is possible, and so far as his observations tend to define when and under what conditions this state exists, they constitute a first step in the solution of the problem.

Now Dr. Hankin observes that in fine weather there is a definite time in the morning, varying

[1] "Animal Flight," a Record of Observation. By Dr. E. H. Hankin. Pp. 405—Index. (London: Iliffe and Sons, Ltd., n.d.) Price 12*s.* 6*d.* net.