His letters do not, I think, entitle him at present to be placed in the category of benefactors, because his checking is unsound and his theory is out of date. Even if he had succeeded in what appears to be his immediate object, and had cooked the forecaster's goose, it would have made a sorry meal. Those who are acquainted with the history of meteorology in this or any other country know that whatever may be the merits of the bird herself, as long as she lives she may lay golden eggs which are very sustaining for the progress of science.

Official forecasts for twenty-four hours in advance are often right and sometimes wrong, but the study of the daily weather by means of maps has a fascination which increases year by year as the observations become more precise and the area covered becomes wider and wider. "Age cannot wither nor custom stale its infinite variety." The subject is so complex and so varied that it is mere vanity to think of taking up the whole of it at once and producing a complete solution applicable to the whole of time. We must take the pieces which our intelligence, such as it is, enables us to tackle. Quite apart from the practical utility to the public, of which others must judge, and which is not quite a single-valued function of accuracy, the daily forecast is absolutely indispensable for the student of atmospheric physics. The daily map serves also a variety of useful public purposes of which the forecasts are only one.

Notwithstanding Mr. Mallock's theory, the forecasts for twenty-four hours are gradually getting more accurate; but, even if his contention were valid, I should still ask to be allowed to continue the study of the daily observations, as my predecessors did from 1867 to 1879, when the issue of forecasts was, once before, suspended in deference to the representations of the learned.

W. N. SHAW.

June 5.

Cellular Structure of Emulsions.

THE letters and photographs published on this subject do not make it quite clear whether the cellular structure observed is confined to the surface, or exists in the interior of the emulsion. Superficial cellular structure is by no means uncommon, and is shown to advantage by thin layers of heavy tar-oil or benzaldehyde on the surface of water. If the phenomenon under discussion is restricted to the surface, it probably falls, as suggested by Mr. Harold Wager, under the heading of the "cohesion figures" first studied by Tomlinson. If, however, the cellular structure extends throughout, some further explanation is necessary, and it would be interesting to know whether any such cases have been observed.

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β and γ Rays and the Structure of the Atom (Internal-Charge Numbers.)

In a previous letter to NATURE (December 25, 1913, p. 477) it was suggested that "a cluster of α particles only may be at the centre of the atom," and that, though the innermost electrons "may have no influence at all on the properties of the elements, and for an electron (or α particle) penetrating from without will belong to the nucleus (see NATURE, November 27, 1913, p. 372), a β particle ejected from near that cluster must pass all other electrons and excite radiation different for each, as dependent on the (successively changing) charge within."

NO. 2328, VOL. 93]

The word "ring" has here been purposely omitted; for from the wave-lengths of the soft γ rays (L radiation) of radium B (Rutherford and E. N. da C. Andrade, *Phil. Mag.*, vol. xxvii., 1914, p. 861), and of the β -ray spectrum of this substance (Rutherford and Robinson, *Phil. Mag.*, vol. xxvi., 1913, p. 724), it may be seen that these frequencies are nearly equal to the square of (probably all) integers from P, the periodic number to A/2, half the atomic weight, multiplied by a constant (3.942×10^{11} /sec.), and that the β -ray spectrum contains only velocities equal to (probably all) integers from P to A/2, multiplied by a constant (3.175×10^8 cm./sec.), so that all the radii of the inner electrons should be different, and these electrons must "be moving in a manner prohibiting any two of them from forming a ring," but not "either form a single ring or rings in parallel planes" (J. W. Nicholson, NATURE, May 14, p. 268, and *Phil. Mag.*, April, 1914, p. 557, respectively), forming a "planetary" rather than a "Saturnian" atom. (P = the periodic number = the number of peripheric electrons; see NATURE, December 25, 1913, p. 477, and March 5, 1914, p. 7, and the periodic system in Table II.)

TABLE I.

I.	II.	III.	IV.	V.	VI.
Charge	$\lambda. 10^8$	$\sqrt{\nu. 10^{-9}}$	N_γ	β	N_β
107-99	—	—	—	—	—
98	0.793	1.945	98.0	—	—
97	0.809	1.926	97.0	—	—
96	—	—	—	—	—
95	0.838	1.892	95.3	—	—
94	0.853	1.877	94.5	—	—
93	—	—	—	—	—
92	—	—	—	—	—
91	0.917	1.809	91.1	—	—
90	—	—	—	—	—
89	0.953	1.773	89.3	—	—
88	0.982	1.748	88.0	—	—
87	1.006	1.727	87.0	—	—
86	1.029	1.708	86.0	—	—
85	1.055	1.687	85.0	—	—
84	1.074	1.670	84.1	—	—
83	1.100	1.650	83.1	—	—
82	1.141	1.620	81.6	—	—
81	1.175	1.597	80.4	—	—
80	1.196	1.583	79.8	—	—
79	1.219	1.569	79.0	—	—
78	1.266	1.539	77.5	0.823	77.8
77	1.286	1.528	77.0	—	—
76	1.315	1.510	76.0	0.805	76.0
75	1.349	1.490	75.0	0.797	75.3
74	1.365	1.482	74.6	0.787	74.4
73	—	—	—	—	—
72	—	—	—	0.762	72.0
71	—	—	—	0.751	71.0
70	—	—	—	—	—
69	—	—	—	0.731	69.1
68	—	—	—	0.719	68.0
67	—	—	—	—	—
66	—	—	—	0.700	66.1
65	—	—	—	—	—
64	—	—	—	—	—
63	—	—	—	—	—
62	—	—	—	0.656	62.0
61	—	—	—	—	—
60	—	—	—	0.635	60.0

Faint lines.

- I. The possible charges for each electron.
- II. The wave-lengths of the γ rays of RaB.
- III. The square root of these γ -ray frequencies.
- IV. The possible charges calculated from III.
- V. The velocities of the so-called β rays of RaB.
- VI. The possible charges calculated from V.