These deviations and especially the progressive ones above 2000 atms. cannot be explained from the temperature difference of 0°.1, among others on account of their irregularity. This would give a pressure difference of no more than 0.6 atm. at 2000 atms. For the rest the deviations are too large and too systematical to be considered as accidental errors of observation. The most obvious explanation, a systematic error in the absolute pressure measurement made by AMAGAT or by us, cannot be accepted either, as it would yield a deviation proportional for large and for small pressures. Probably the same causes come into play, which also prevented agreement between AMAGAT and SCHALKWIJK's observations.

Amsterdam. *Physical Laboratory of the University*

Hydrostatics. — "*The different ways of floating of an homogeneous cube.*" By Prof. D. J. KORTEWEG.

(Communicated in the meeting of May 30, 1914).

This problem, whose treatment, however simple it may seem, offers considerable difficulties, was lately brought to a complete solution by Dr. P. BRANDSEN.

If we limit ourselves to the cases in which the specific weight of the cube amounts to less than half of that of the liquid (which is allowed, because the other cases may be derived from it by interchanging the floating and immersed parts) stable floating appears to be possible in four different possitions.

In the *first position* four of the edges are vertical. It may be acquired for specific weights, expressed in that of the liquid, smaller than $\frac{1}{2}-\frac{1}{6}\sqrt{3}=0{,}211\ldots$ For those smaller than $\frac{1}{6}=0{,}166\ldots$ it is the *only one* possible.

In the *second position* two of the faces are vertical, but the edges belonging to them are sloping. The surface section is consequently a rectangle. This manner of floating is possible between the specific weights 0,211 .... and 0,25.

In the *third position* the space-diagonal of the cube is vertical and the surface section a hexagon. It is possible between the limits $\frac{1}{6}$ and $\frac{5}{6}$ of the specific weight. For the limits themselves the cube is lifted or immersed just so far that the surface section, perpendicular to the space-diagonal, has passed into a triangle. Those limiting positions themselves are already unstable; consequently the stability

of this position disappears exactly there where for specific weights $< \frac{1}{6}$ *a hexagonal section becomes impossible on account of* ARCHIMEDES' Law.

This third manner of floating was, probably for the first time, referred to in the "Mathematical Gazette" of Dec. 1908, Vol. 4, p. 338, Math. note N°. 285, in which note, however, the second one and the case now following was not referred to at all.

In the *fourth position* one of the planes passing through two opposite parallel edges assumes the vertical direction. In this position one of these edges is partially immersed, the other one quite outside the liquid. In consequence of this the surface section is a pentagon for which the intersection of the liquid surface with the plane just mentioned is an axis of symmetry.

Such "pentagonal" floating can only exist, however, between narrow limits of density, viz. between the densities 0,226... and 0,24...

It should be observed that only the first and the second position gradually pass into each other; further that a completely unsymmetrical way of floating, in which neither one of the faces, nor one of the diagonal planes, nor a space-diagonal assumes the vertical position, cannot arise.

One of the greatest difficulties connected with the problem consisted in the formal exclusion of such cases.

It further appears that between definite limits of density, several positions, amounting at most to three, are possible for the same cube, viz.,

Below 0,166... the first position is the only possible.
From 0,166... to 0,211... the first and the third.
From 0,211... to 0,226... the second and the third.
From 0,226... to 0,24 ... (the limits of pentagonal floating) the second, the third and the fourth.
From 0,24... to 0,25 the second and the third.
Between 0,25 and 0,5 only the third.

Strictly speaking one case in which one of the diagonal planes coincides with the liquid-level and the specific weight therefore amounts to exactly 0,5 ought to have been added to those mentioned above. Dr. BRANDSEN has indeed proved that stability exists in this case. Yet at the slightest alteration of the specific weight the adjacent positions of equilibrium become unstable, e.i. those which arise by

lifting the cube a little or by immersing it in such a way that the diagonal plane mentioned remains parallel with the liquid-level.

A paper by Dr. BRANDSEN in which the results described above are set forth and proved is going to appear in the "Nieuw Archief voor Wiskunde".

Petrography. — *"On some rocks of the Island of Taliabu (Sula Islands.)"* By Prof. Dr. A. WICHMANN.

(Communicated in the meeting of May 30, 1914).

After G. E. RUMPHIUS had described. towards the end of the 17th century, some jurassic fossils, originating from the east coast of Taliabu [1]) it was not before the year 1899 that new geological investigations were made again in the island mentioned above. It was R. D. M. VERBEEK who collected some rocks in some places of the north coast on the 4th and 5th of August and afterwards described them [2]). In November of the same year G. BOEHM followed his example, and chose as point of departure of his investigations the findingplace mentioned by G. RUMPHIUS, and afterwards continued his work over part of the south coast [3]) In December 1902, in January and especially during the months of October and November 1904 an extensive part of the southern part of Taliabu was surveyed by J. W. VAN NOUHUYS [4]). The large collection gathered by him was described by G. BOEHM [5]), in so far as regards the fossils. In the following lines the communication of an investigation of the rocks may find a place.

[1]) D'Amboinsche Rariteitkamer. Amsterdam 1705, p.p. 253—255.

[2]) Voorloopig Verslag over eene geologische reis door het Oostelijk gedeelte van den Indischen Archipel in 1899. Batavia 1900, p.p. 9, 10, 46, 47. — Molukken-Verslag. Jaarboek van het Mijnwezen van Ned. Indië. **37**. 1908. Wetensch. ged. Batavia 1908, p.p. 20—21, 107—108, 221—223.

[3]) Aus den Molukken. Zeitschr. d. D. geol. Ges. **54**. 1902. p. 76. — Geologische Mitteilungen aus dem Indo-Australischen Archipel. N. Jahrb. f. Min. Beil. Bd. **27** 1906, p.p. 385—395. — Beiträge zur Geologie von Niederländisch-Indien Palaeontographica. Suppl. IV. Stuttgart. 1904, p.p. 6, 13—14.

[4]) Maatschappij ter bevordering van het Natuurkundig Onderzoek der Nederlandsche Koloniën Bulletin No. 48. 1905. — Bijdrage tot de kennis van het eiland Taliaboe der Soela-groep (Molukssche Zee) Tijdschr K. Nederl. Aardrijksk. Genootsch. (2) **27**. Leiden 1910, p.p. 945—976, 1173—1196.

[5]) Beiträge zur Geologie von Niederländisch-Indien. Palaeontographica. Suppl. IV 1912, p.p. 123—177.