11.15 P.M.—A deep red glow from E. to W. by S. along the horizon. Fourteen parallel bands of a silvery colour, with dark bands between them. They lie south and north, occupying nearly the whole southern hemisphere as far as the eye can reach, and are flanked at east and west by patches of blood and cherry red.

11.24 P.M.—The bands have disappeared. There is a deep red glare at E.S.E. and a lighter one at W.S.W.

11.28 P.M.—A few faint bands on either side of Canopus. A red light on their western, but none on their eastern side.

11.31 P.M.—A dark red glow at W.S.W., about 12° above the horizon.

11.33 P.M.—Clouds gathering in the lower regions of the atmosphere.

11.37 P.M.—Two parallel faint beams of whitish light 2° to 3° east of Canopus. A faint red glow at W.S.W., about 10° above the horizon.

11.42 P.M.—Two broad bands of faint whitish light to westward and three to eastward of Canopus. A patch of red light still at W.S.W. near horizon.

11.46 P.M.—Clouds gone. Aurora gone.

11.49 P.M.—A faint red glow at W.S.W. about 10° above the horizon, and a band of faint greyish light about 2° west of Canopus.

11.51 P.M.—The glow at W.S.W. is brighter and higher.

11.58 P.M.—Much fainter.

0.34 A.M.—A segment of dark red light from S.E. by S. to W.S.W., and rising at its middle to about 45° above the horizon.

1.20 A.M.—A bright red glow from S.E. to S.W. Intensest below the Centaur. Soon died away. J. MELDRUM

Royal Alfred Observatory, Mauritius, February 6

GEOLOGY

Supposed Legs of Trilobites*

MR. HENRY WOODWARD, of the British Museum, in a reply to the paper by the writer in vol i., p. 320, of the present series of this Journal, supports the view that the supposed legs are real legs. He says that the remark that the calcified arches were plainly a calcified portion of the membrane or skin of the under surface is "an error, arising from the supposition that the matrix represented a part of the organism." But Prof. Verrill, Mr. Smith, and myself, are confident that there is on the specimen an impression of the skin of the under surface, and that this surface extended and connected with the arches, so that all belonged distinctly together.

Moreover the arches are exceedingly slender, far too much so for the free legs of so large an animal; *the diameter of the joints is hardly more than a sixteenth of an inch outside measure; and hence there is no room inside for the required muscles.* In fact, legs with such proportions do not belong to the class of Crustaceans. Moreover the shell (if it is the shell of a leg instead of a calcified arch) is relatively thick, and this makes the matter worse.

We still hold that the regular spacing of these arches along the under surface renders it very improbable that they were legs. Had they been closely crowded together, this argument would be of less weight; but while so very slender, they are a fourth of an inch apart. Mr. Woodward's comparison between the usual form of the arches in a Macrouran and that in the trilobite does not appear to us to prove anything. We therefore still believe that the specimen does not give us any knowledge of the actual legs of the trilobite. Mr. Woodward's paper is contained in vol. vii., No. 7, of the *Geological Magazine.*

J. D. DANA

PHYSIOLOGY

Blood Crystals

AN interesting volume has just been published by M. W. Preyer on Blood Crystals. The literature of this subject, which dates no farther back than 1840, is already extensive, no less than 143 authors being quoted in the "Bibliography," some of whom, as Böttcher, Hoppe-Seyler, Kühne, Lehmann, Rollett, Valentin, and M. Preyer himself, have written many separate essays on points bearing more or less directly upon the crystallisation of the blood. Though blood crystals were first observed by Hünefeld, the merit of discovering them is due to Reichert, who first recognised their nature. The fact of the crystallisation of a complex organic substance like blood was first received with some amount of incredulity, but the corroborative testimony of many microscopists soon cleared away all doubt, and a variety of methods were suggested by which the crystals could be obtained. The best plan for obtaining them is thus given by M. Preyer. The blood is received into a cup, allowed to coagulate, and placed in a cool room for twenty-four hours. The serum is then poured off, and a gentle current of cold distilled water passed over the finely divided clot placed upon a filter until the filtrate gives scarcely any precipitate with bichloride of mercury. A current of warm water (30°—40° Cent.) is now poured on the clot, and the filtrate received in a large cylinder standing in ice. Of this a small quantity is taken, and alcohol added drop by drop till a precipitate falls from which an estimate may be made of the quantity required to be added to the whole *without* producing a precipitate. The mixture, still placed in ice, after the lapse of a few hours, furnishes a rich crop of crystals. The forms of the crystals obtained from the blood of different animals do not vary to any great extent, and are all reducible to the rhombic and hexagonal systems. The vast majority are rhombic prisms, more or less resembling that of man. The squirrel, however, with several of the Rodentia, as the mouse and rat, and the hamster, are hexagonal. The hæmoglobin of several corpuscles is required to form a single crystal. All blood crystals are double refracting. The animals whose blood has been hitherto examined and found to crystallise, are—man, monkey, bat, hedgehog, mole, cat, lion, puma, fox, dog, guinea pig, squirrel, mouse, rat, rabbit, hamster, marmot, ox, sheep, horse, pig, owl, raven, crow, lark, sparrow, pigeon, goose, lizard, tortoise, serpent, frog, dobule, carp, barbel, bream, rudd, perch, herring, flounder, pike, garpike, earthworm, and nephelis. The spectrum of blood-colouring matter when oxidised with its two absorption striæ between D and E of Fraunhofer's lines or in the yellow part of the ordinary spectrum, and the single band of deoxidised hæmoglobin, are now well known. M. Preyer states he has not been able to obtain a spectrum from a *single* blood corpuscle, but that the characteristic bands are visible where certainly only a very few are present. The specific gravity of dry hæmoglobin he gives at about 1·3—1·4. The solubility of the crystals obtained from different animals varies considerably. Those of the guinea-pig and squirrel dissolving in water with great difficulty. Hæmoglobin is insoluble in absolute alcohol, æther, the volatile and fixed oils, in benzole, turpentine, chloroform, and bichloride of carbon. It is easily soluble in alkalies; acids rapidly decompose it. He calculates out for it the fearful formula of C_{600} H_{960} N_{154} Fe, S_3 O_{179}, as agreeing very accurately with the percentage results of its analysis. Its equivalent is 4444, 4. Many pages of M. Preyer's work are occupied with an account of the action of various reagents upon it. The plates contain the forms of the principal crystals, and thirty-two spectra lithographed in colours. He describes five crystallisable products of the decomposition of hæmoglobin, namely, hæmin, hæmatosin, hæmatoidin, hæmatochlorin, and hæmatolutein, and several uncrystallisable, such as methæmoglobin, hæmatin, and hæmathion.

H. P.

SCIENTIFIC SERIALS

Annalen der Chemie und Pharmacie, September 1871.—Kochlin has continued his researches on "compounds of the camphor group." By the action of nitric acid on camphor the author has obtained a new body, $C_9H_{12}O_5$, which he calls camphoronic acid, and which has the property of forming salts in which H_2 and H_3 are replaced by metals. By distillation with potassic hydrate, butyric acid is produced; with bromine in presence of water camphoronic acid is oxidised, yielding oxy-camphoronic acid; this acid forms salts, in which H_1, H_2, and H_3 are replaced by metals.—An important physiologico-chemical paper follows by Hlasiwetz and Habermann on "Proteids," and a paper by Naumann on the length of time for the evaporation and condensation of solid bodies," which, however, do not possess much general interest.—Bender contributes a paper on the "hydrate of magnesic oxychloride." This substance, however, does not appear to be very stable, or to have very marked properties.—Mulder has experimented on allantoin and bodies

* From the *American Journal of Science and Arts* for March 1872.