NOTES ON INORGANIC CHEMISTRY.

In a recent number of the *Journal für Gasbeleuchtung* an account by M. van Breukeleveen and A. ter Horst is given, taken from *Het Gas*, of serious trouble from the formation of iron-carbonyl in water-gas mains. This Dutch works manufactures uncarburetted water-gas for use in Welsbach burners, and it is found that in a short time the mantel of the burner loses all its brilliancy owing to the deposition of a brown substance, which micro-chemical analysis proved to be iron. This proved to have been deposited from the iron-carbonyl formed, not in the process of manufacture of water-gas, but in its passage through the cold iron pipes, at ordinary pressure. The only practical remedy seems to be coating the interior of the pipes with tar. A similar deposit is often noticed on the lines used in the Drummond light, where instead of hydrogen, compressed water-gas or even coal gas in steel or wrought iron cylinder is used. Here the only remedy for the diminishing of the light consists in turning the lime quite often.

In the following number of the *Journal* Broockmann takes up the old problem of the gases contained in bituminous coal. At 100° E. von Meyer found a maximum of 238 cubic centimeters gas given off from 100 grams of coal, while Bedson found as high as 818 cc. The great variation in quantity as well as in composition is ascribed, in part at least, by Broockmann to the presence of more or less atmospheric air. He himself worked with a Sprengel vacuum which was kept with repeated warming for three days before the coal was heated, a temperature of 100° then being used. In this way a number of Westfalian coals gave from 7 to 150 cubic centimeters per hundred grams, an English coal 70 cc., a lignite from Habichtswald 50 cc. The gases obtained were generally chiefly methane with more or less carbon dioxid. Higher hydrocarbons, carbon monoxid, and oxygen were rarely present and then only in small quantities. One of the Westfalian coals gave little methane, more carbon dioxid, and over 60 per cent. of nitrogen. Two Oberschlesian coals gave a mixture of carbon dioxid and nitrogen, and the lignite gave 91 per cent. carbon dioxid and nine per cent. carbon monoxid. When heated with air in a closed tube to 160°–200° the oxygen of the air is completely absorbed, leaving only nitrogen with a very little carbon dioxid.

The precipitation of gold by iron pyrites is investigated by P. V. Gladkov in the *Berg- und Hüttenmannische Zeitung*. A solution of gold chlorid is completely precipitated by filtering through a layer of pyrites; if the pyrites carry copper, this and not iron replaces the gold in solution. The reduction takes place in pyrites which have been carefully washed by acid and hence is caused by the sulfid and not by any ferrous sulfate which might have been formed by weathering. The gold is precipitated not as sulfid, but as metallic gold, as is shown by the fact that it can be amalgamated with mercury. This study has considerable bearing on the treatment of pyrite ores of gold.

J. L. H.

CURRENT NOTES ON PHYSIOGRAPHY.

THE CHATTANOOGA DISTRICT.

The 'Physiography of the Chattanooga district, in Tennessee, Georgia and Alabama' is elaborately discussed by C. W. Hayes (19 Ann. Rep., U. S. G. S., Pt. II., 1–54, 5 colored maps). The mountains of post-Carboniferous deformation were reduced in Cretaceous time to a broad peneplain (the Cumberland) with scattered or grouped monadnocks; 'unakas' being suggested as a name for grouped residuals. General uplift of the region allowed the development a less extensive peneplain (the Highland-Rim) probably in Eocene time; and a still later uplift permitted the excavation of the present valley floors in Neocene time. The peneplains are referred to subaerial instead of to marine denudation, after a critical review of their origin. Special consideration is given the development and adjustments of the drainage system; the chief streams first flowed westward into an interior sea; then southward along the troughs of Appalachian deformation; then westward again as a result of the shifting of divides by stream action chiefly in the first and second cycles of gradation. It is pointed out that the Tennessee may in the future be once more turned southward

by the headward growth of the Coosa. Ridges of hard strata, produced by the dissection of an uplifted peneplain of monoclinal structure, are believed to retain their even crests while reduced toward the new baselevel, and hence should not alone be taken as indicating a peneplain. Differences of structure are recognized as controlling many local drainage adjustments, but broader modifications of drainage are believed to result from "the slight warping of the land service which appears to accompany all uplifts."

RIVER SPACING AND REGIONAL BEVELING.

A WELCOME continuation of the discussion on peneplanation begun by Tarr (*Amer. Geol.*, June, 1898) is found in articles by Shaler (Spacing of rivers with reference to hypothesis of baseleveling. *Bull. Geol. Soc. Amer.*, X., 1899, 263–276) and Tangier Smith (Some aspects of erosion in relation to the theory of the peneplain, *Univ. Cal., Bull. Dept. Geol.*, II., 1899 155–178). The first article suggests that the often observed approach to uniformity of interval between adjacent valleys, and to uniformity in the slope of valley sides "tends to bring about a likeness in the height of the divides even where the original surface was of varied elevation"; and the so-called peneplains of the Appalachian region (such as those of the Chattanooga district, referred to above) are thought to be better accounted for in this way than by baseleveling; but the best preserved peneplain of this region, that of the Piedmont belt, is regarded as beyond explanation by river and atmospheric action, and is therefore by implication referred to a marine origin.

The second article deals more elaborately with the development of graded valley sides and with the correlations of summit height, side slope, and stream action in regions of mature dissection. The roughly equal spacing of the principal rivers of a topographic unit is said to 'follow as a necessary corollary' from the general principles thus deduced. Regions exhibiting a general uniformity of summit height, but so maturely dissected as no longer to preserve remnants of their initial uplands, are regarded as more probably explained by stream spacing and hill grading in the present cycle, than by peneplanation in a former cycle. The beveling of a region by the more rapid degradation of the hills near the coast than in the interior, as previously suggested by Tarr and here more fully stated, is held to give sufficient explanation of facts that have been referred by others to the unequal uplift or tilting of a peneplain. On the other hand, uplands that consist of truncated hills of accordant height, capped with residual soils and bearing old river gravels, are regarded as true uplifted peneplains.

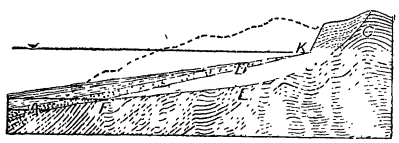
As to beveling *versus* tilting, truly the degradation of hills must be a little faster near the coast than in the interior, but the excess does not account for the slanting descent of the New England upland southward to the shore of Long Island sound, or for the gradual decrease in height of the Cumberland penelain from Tennessee into Alabama.

AN ANCIENT PLAIN IN COLORADO.

W. O. CROSBY gives a detailed account of the remarkably smooth floor of crystalline rocks on which the Cambrian sandstones rest in the Rocky Mountain front range in Colorado. Although now tilted and more or less deformed, the floor is described as originally of very faint relief, with residual eminences only three or four feet high over areas of many square miles; but it may be noted that broad swells and troughs are not excluded by any direct evidence. Comparing this with other smooth sub-Cambrian floors in the United States, Crosby concludes that they are all parts of an extensive surface of planation (abrasion), produced during a period of slow subsidence, by marine attack on a region that "may very well have been reduced to a peneplain by prior subaerial erosion" (*Bull. Geol. Soc. Amer.* X., 1899, 141–164).

The occurrence of marine strata on a floor of firm, unweathered rock certainly points to marine abrasion before deposition began, but it may be urged that the prevailing absence of valleys in the even sub-Cambrian floor suggests the change of 'may very well have been' to 'must have been' in the preceding quotation. The broad floor was in any case the result of the destruction of an extensive pre-Cambrian

highland or mountain region, for its rocks are of deformed structure or of deep-seated habit over large areas. During the long period of combined sub-aerial and marine attack upon the highland, large rivers must have cut down deep valleys, while sea waves abraded a plane around its litoral margin; that is, the valley, *CEF*, would have been eroded, while the marginal plane, *AF*, was abraded. In the time needed to give *AF* a breadth of several miles, the main valley, *EF*, would be reduced to very



gentle slope. Under the supposition that the surface attacked by the encroaching sea was of such a relief that a considerable subsidence might occur during its submergence, the valley, *FE*, would in time be buried by the sediments, *ADK*. No buried valleys are known in the even sub-Cambrian floor. Their absence can be explained only under the supposition that the sea abraded the land to a greater depth than the valleys had been cut in it, and hence that but moderate subsidence occurred during abrasion. Under this limiting condition, extensive peneplanation must have occurred before great marine encroachment by abrasion could have been accomplished.

THE URAL MOUNTAINS.

The excursion of the International Geological Congress to the Ural Mountains in 1897 gave Dr. F. P. Gulliver opportunity for reaching the following conclusions regarding the evolution of their existing form. A long period of sub-aerial planation, probably aided by marginal marine action, reduced the region to a lowland surmounted by a few monadnocks. The lowland was then arched by successive uplifts, the axes of greatest elevation being east of the middle of the range; and benched valleys were eroded beneath the general upland level.

Approaching the range from the west, there is a gradual transition from the great Russian planes of nearly horizontal structure to the dissected peneplain of deformed structures. Approaching from the east, a part of the old mountain peneplain remains at moderate altitude adjoining the Siberian Tertiary plains; unexplained lakes occur in this part of the peneplain, which is generally separated from the revived mountains on the west by an abrupt ascent, thought to be a weathered fault scarp (*Bull. Geol. Soc. Amer.*, X., 1899, 69–82).

W. M. Davis.

---

*NOTES ON TERRESTRIAL MAGNETISM.**

Captain Denholm Fraser, R.E., is at present engaged in making the necessary arrangements for inaugurating a magnetic survey of India and Burma.

Captain Lyons, R.E., in charge of Geological Survey of Egypt, has for some years been making magnetic observations during his journeys in various parts of Egypt. It is hoped that before long a systematic magnetic survey of Egypt can be undertaken.

Two proposed sites for the Standard Magnetic Observatory in the vicinity of Washington have been examined during the past month by magnetic parties under Dr. Bauer's direction, in order to determine the most suitable place. One of these sites, situated twenty-two miles to the northwest of Washington, has revealed pronounced magnetic anomalies, while the other site, sixteen miles to the southeast of Washington, has thus far shown no abnormal values. The latter site appears to be also a favorable one as far as freedom from electric tramway influence is concerned.

There are at present four observatories at mining stations in Germany, at which the variations of the magnetic declination are being continuously recorded by photographic means, viz.:

1. Clausthal, Harz. This observatory has been in existence since the days of Gauss. It is provided with a Gaussian declinometer for eye-readings, and a more modern instrument for self-registering purposes. Copies of the daily records can be had upon application.
2. Beuthen, Upper Silesia.
3. Bochum, Westphalia.
4. Hermsdorf, bei Waldenburg.

The last three-named stations were started at

* From advanced sheets of *Terrestrial* Magnetism.