be difficult to prove any thing except accidental coincidences among the lines of the different elements. Accurate investigation generally reveals some slight difference of wave-length or a common impurity.

Furthermore, the strength of the lines in the solar spectrum is generally very nearly the same as that in the electric arc, with only a few exceptions, as, for instance, calcium. The cases mentioned by Lockyer are generally those where he mistakes groups of lines for single lines, or even mistakes the character of the line entirely. Altogether there seems to be very little evidence of the breaking-up of the elements in the sun, as far as my experiments go.

Even after comparing the solar spectrum with all known elements, there are still many important lines not accounted for. Some of these I have accounted for by silicon, and there are probably many more. Of all known substances, this is the most difficult to bring out the lines in the visible spectrum, although it has a fine ultra-violet one. Possibly iron may account for many more, and all the elements at a higher temperature might develop more. Then, again, very rare elements, like scandium, vanadium, etc., when they have a strong spectrum, may cause strong solar lines, and thus we may look for new and even rare elements to account for very many more. Indeed, I find many lines accounted for by the rare elements in gadolinite, samarskite, and fergusonite other than yttrium, erbium, scandium, praeseodymium, neodymium, lanthanum, and cerium, which I cannot identify yet, and which may be without a name. For this reason, and to discover rare elements, I intend finally to try unknown minerals, as my process gives me an easy method of detecting any new substance or analyzing minerals however many elments they may contain.

The research is much indebted to the faithful and careful work of Mr. L. E. Jewell, who has acted as my assistant for several years. Preliminary publications of results will be made in the *University Circulars*.

Among the latest results I may mention the spectroscopic separation of yttrium into three components, and the actual separation into two. HENRY A. ROWLAND.

DUTCH BORNEO.[1]

LITTLE is known of the interior of the Island of Borneo, and therefore the information supplied by Heer S. W. Tromp in the *Tijdschrift van het Kon. Nederlandsch Aardrijkskundig Genoot.*, Deel vii. No. 4, though incomplete, is very acceptable. In 1885 he steamed up the Mahakam River to Muvara-Pahu, a village about 190 miles from the sea. Near the coast the land is flat, and is being laid out in rice-fields. It would also, in Heer Tromp's opinion, be suitable for the cultivation of sugar-cane. Farther up the river, hilly country is entered, covered with a layer of yellowish-red soil, of little value for agriculture. After eight hours' steaming from Samarinda, Heer Tromp passed the mouth of the Sebulu River, and two hours and a half later reached Naga-Beulur. Here the hills, which extend from Pelarang (a short distance below Samarinda), suddenly terminate, and the river emerges through a narrow channel from a level tract, stretching northwards probably to the frontier of Berau, which was formerly the bed of a large lake. Even now this depression is not entirely filled up. Meres and morasses of large area lie on either side of the Mahakam, and when the water is high, that is, during the greater part of the year, a large proportion of the country is submerged. The district of the Upper Mahakam is inhabited by a tribe of Dyaks, known as Bahau-Dyaks in Kutei, and elsewhere as Pari-Dyaks. Their number is estimated at 4,500. Formerly they were notorious head-hunters, and were much dreaded in the Baritu valley, but of late greater security has been established by the interference of the Sultan of Kutei.

The development of the country, however, has not been accelerated thereby, for, with the festivals held on the bringing-home of heads, has also disappeared the stimulus to industry. Large sums were formerly expended in gala-dresses for the women, of silk adorned with beads; and tobacco and rice were provided in abundance. Moreover, the Buginese dealers, as they have circulated more freely through the country, have introduced hazard and cock-fighting, with the most disastrous consequences. The steamer in which Heer Tromp travelled was unable to ascend the river beyond Muvara-Pahu, but he himself advanced some distance farther in a rowing-boat. As far as Juhalang the river is easily navigable; but beyond, the current is too strong, except when the water is abnormally low, and at Kapala-kiham a series of waterfalls practically limits the navigation.

Hence the difficulty of extending Dutch rule into Upper Kutei. Indeed, communication with Sarawak along the Seliku, one of the most important affluents of the Mahakam, which rises in the Batu-Tibang opposite the sources of one of the tributaries of the Batang-Rejang, seems to be more feasible than with the Lower Mehakam. It is also possible to reach the Upper Kayan by the Boh River, which enters the Mahakam above the first fall; but it necessitates a journey of eight days on the river, and three over uneven and stony country to the highest navigable point of the Laya, a tributary of the Kayan. In the last-mentioned river an obstruction is said to exist even more formidable than the falls on the Mahakam. This remote country is inhabited by a number of Dyak tribes, which, as well as the Bahau-Dyaks of the Malakam, the Kenyas of the Upper Kayan, and others, had their home originally near the sources of Kayan. Since such insurmountable obstacles to communication exist on the routes already discussed, Heer Tromp turns his attention to the Kapuas River on the west. He passes over the lower course of the river up to Bunut with only a few cursory remarks, as it has been already described by Professor Veth in his *Borneo's Westerafdeeling*. The town of Bunut, at the mouth of a tributary of the same name, is the capital of the last Malayan kingdom.

Several affluents enter the main stream before the next town of any importance, Putus-Sibow, is reached. Here the Dyaks carry on a considerable trade with the Malay dealers, bartering the products of their forests against copper utensils, salt, tobacco, linen, crockery, etc. In 1888 Heer Tromp ascended this river, the Kapuas, in a steamer as far as the mouth of the Mendalam, a distance of 400 miles from the sea. It will be seen at once that it possesses a great advantage over the Mahakam, on which navigation is possible only for a distance of 250 miles.

Moreover, the Mendalam can be ascended by steamer, and Heer Tromp continued his journey in a boat up the Kapuas itself as far as Lunsa. Hajji Achmet, a native clerk, ascended the Bongan River, which enters the Kapuas at Lunsa, and its affluent the Bulet, to a point whence, he heard, the Seputan, a tributary of the Kaso, which flows into the Mahakam, could be reached in a day's march. This appears probable, for nowhere in this country are elevations of any great height to be seen. The Taman-Dyaks, who dwell on the Upper Kapuas, are more civilized than the Bahaus or the Kayans. Their women wear tasteful sarongs ornamented with beads and shells, and do not tattoo themselves, like the Kayan women.

[1] From the Scottish Geographical Magazine for February, 1891.

EDUCATION IN GERMANY.[1]

THE resolutions arrived at by the Conference on School Reform in Berlin may be summed up as follows: —

(1) Only two kinds of high schools are to survive, — gymnasia and non-Latin or non-classical schools (oberrealschulen and höhere bürgerschulen). A common lower school for gymnasia and non-Latin schools, so warmly advocated by many, is considered undesirable. The change from the one school to the other will be facilitated in every possible manner.

(2) The over-pressure, which is one of the most crying evils at the present time, is to be greatly reduced. A diminution of the hours devoted to Latin and Greek is considered possible, without any risk to the supremacy of classics. The Latin essay is to be abolished, as well as the Greek translation in the written examination for remove into the prima. German is to become the chief subject of instruction. Contemporary history is to be more thoroughly studied, without, however, adding to the hours assigned to history.

[1] From the London Journal of Education.