engineers and an escort of natives, will advance southward from the Wargla, and, after passing the summer at the Jebel Ahaggar, will proceed by the Houssa to Sokoto, and ascending the Niger to Timbuctu, will return by way of Senegal. The Anthropological Society of Paris has availed itself of the permission granted it of sending out observers competent to undertake the ethnological study of the races with which the expeditions will come in contact, and has entrusted to Dr. Guyard the superintendence of the scientific staff which will accompany the Government explorers.

PROF. WALDHAUER, of Dorpat, has visited the northern boundaries of Courland, near the Riff of Domesnæs, in the Gulf of Riga, with a view of studying the condition of the small remnant of people living there, who are the sole representatives of the ancient races of Courland and Livonia. These persons, about 2,400 in number, occupy a limited area of about a verst in width between Mellesilla and Lyserort, and are separated from the Letts in the interior by a tract of morasses. They exhibit great national pride, deny their affinity with the Esthonians, are ignorant of the term Livonian, and call themselves "randalist," inhabitants of coast-lands, or "kalamied," fishermen. They are hardy sailors and skilful pilots. Several families occupy one long hut in common, and their villages resemble those of the Esthonians. They are usually fair-skinned, with chestnut or dark-brown hair; the beard, which is generally very abundant in middle life is seldom seen in young men before the age of twenty-five. Prof. Waldhauer has seen no instance of a red beard among them.

THE Chilian Government has just published in English, Spanish, and French, a "Synopsis Statistical and Geographical of Chili," treating of the condition of the country from January, 1878, to September, 1879. Among other useful matter it contains a short historical sketch, besides notes on its geographical position and physical aspect, its industrial zones, geological constitution, ethnography, and medical geography.

IN the new number of the Belgian Geographical Society's *Bulletin*, M. A. J. Wauters opportunely furnishes an article on Karema, on the eastern shore of Lake Tanganyika, where M. Cambier has just commenced the establishment of the first Belgian "Station hospitalière et scientifique" in East Central Africa.

THE *Cape Argus* publishes the results of the recent attempt to relieve the Trek Boers from the West Coast. After Mr. Palgrave returned to Capetown with the information that they had temporarily settled in what is called the Kaoko Veldt, Mr. Haybittle, by dint of hard travelling and the assistance of traders whom he met, succeeded in reaching the Boers in twenty-one days from Walfisch Bay. He describes the spot where he found them as a long limestone ridge about a day's journey from end to end, and about two days' journey south of the River Cunene, the nearest point on the coast being Point Rock, a distance of thirteen days' journey. In this ridge there are a number of depressions, in some of which springs are found, whence arises the name of Six Fountains. The country is almost devoid of population.

THE original paper in last Heft of the fourteenth volume of the Berlin Geographical Society's *Zeitschrift* is on the region around Koseer on the Red Sea, by Dr. Klunzinger. This number contains the usual annual bibliographical list of publications in all departments of geography, the most exhaustive and carefully arranged list of the kind to be found anywhere. In the *Verhandlungen* for November and January are important papers on the Marquesas Islands, by Baron von Schleinitz; on the Cordillera Passes, by Baron von Theilmann; on a journey on the Ural in the summer of 1879, by Dr. Arzuni; on agriculture in Japan, and on the geological survey of that country, by Dr. E. Naumann; and on the question whether the Andes are sinking, by Herr W. Reiss. Herr Reiss, after a careful review of what we know as to the condition of the coasts of Central and South America, where, while in one or two places a sinking seems apparent, a general rising is mostly proved, comes to the conclusion that the South American Continent, including the Andes, is increasing and not diminishing in elevation.

THE well-known traveller, Herr Ernst von Hesse-Wartegg, who has been staying in London for some time, delivered an interesting lecture on Thursday last, to the members of the German Athenæum, in Mortimer Street. The subject of the lecture was the social life of the Prairie Indians of North America, and was illustrated by numerous photographs and ethnological objects.

THE German Palestine Society has recently published part 3 of the second volume of its *Proceedings*. It contains a treatise on the Sulphur of the Jordan Valley, by Dr. Fraas (Stuttgart); a communication respecting the discovery of some valuable coins near Jerusalem, by Dr. Erman (Berlin); Notes on a Journey to Moab in 1872, by Rev. Klein (Kaiserslautern); an alphabetical list of all the localities in the Pachalik of Jerusalem, by Dr. Socin (Tübingen); an article on the ruins of Askalon, by Lic. Guthe (Leipzig), and various financial and administrative reports. The Society's last general meeting was held at Treves in September last. The efforts of the Society are now directed towards establishing a fund for scientific exploring expeditions to Palestine.

AT the last meeting of the Berlin Anthropological Society the latest news received from Prof. Bastian and Dr. Finsch were communicated by the president. Dr. Bastian stayed at Batavia until October last, and then left that place; he does not mention where he intended to proceed to next, but seems to have started on a prolonged tour, as he has sent all his collections and the scientific results of his investigations to Berlin. Dr. Finsch writes from the Marshall Islands, and says that intercourse with the natives of that group of islands is very difficult and expensive. He has collected over 300 ethnological objects, most of which, however, date from the places he visited before arriving in the Marshall group.

THE German Admiralty intends to publish a work on the scientific voyage round the world, made by the German corvette *Gazelle* during the years 1874 to 1876. The work will be divided into three parts. Part I. will contain a short description of the origin of the expedition, its objects and a general account of the voyage. The second part will be devoted to the deep-sea measurements, the meteorological and magnetical observations. Part III. will treat of the marine fauna and flora. The total cost of the work is estimated at 60,000 marks (3,000*l.*), for which the Admiralty will apply to the Federal Council.

NO. III. for 1879, of the *Journal* of the Asiatic Society of Bengal, contains a valuable *résumé* of the survey work accomplished during the Afghan campaign by the surveying officers attached to the various columns.

AT the meeting of the Geographical Society on Monday next an account by Mr. Hore, of the London Missionary Society's station at Ujiji, of his recent exploration of the Lukuga outlet of Lake Tanganyika, will be read, as well as a paper by Dr. Emil Holub, on the Marutse-Mabunda Empire in South Central Africa.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE

CAMBRIDGE.—The Rev. J. C. Saunders, of Downing College, is announced to lecture this term on "Chemistry, Physiology, and Botany," and Messrs. Saunders and Hicks are the examiners in the coming "Special" B.A. examinations in natural science for an ordinary degreee, taking in geology and the other subjects mentioned.

NATURAL science scholarships are offered this year at Clare College (60*l.*), Caius (40*l.* or 60*l.*), King's (the Vintner of 90*l.*), Christ's, Emmanuel, and Sidney Sussex, St. John's (50*l.* for three years), Trinity and Downing (40*l.* to 70*l.*) In most colleges preference will be given to students under twenty by calling them Minor Scholars; exhibitioners, in general, may be of any age.

AT present botany and vegetable physiology appear to be getting more and more at a discount in Cambridge, notwithstanding the able teaching of Dr. Vines. He has had to close his laboratory, the room being otherwise required; and Dr. Hicks, (Sidney), sustains the burden of teaching botany during the term in both elementary and advanced lectures, in addition to the joint demonstratorship in chemistry. Several lectureships in botany are vacant in London.

AN amended series of regulations has been issued and will probably be carried, in regard to the Cambridge Natural Sciences Tripos. Twelve months' notice is to be given of the branches of science in which the practical examination is to be held. The class list in the first part of the examination is to be quite distinct from that issued after the second part. In the

second part of the examination there will be two questions at least in each branch of science included in the examination in each paper.

THERE are now about ten courses of professional and inter-collegiate lectures announced at Cambridge for the benefit of the selected Indian Civil Service Candidates; so that Oxford, Cambridge, and London are fairly in the field of competition in educating men for this great field of labour.

WE notice with pleasure that the Cambridge Senate have conferred the honorary degree of Master of Arts on Mr. Pattison Muir, prælector in chemistry at Caius College.

MR. J. G. FITCH'S lectures at Cambridge this term, on the practice of education, are attended by between sixty and seventy students, of whom about one-half are men. The new literary schools are soon in use. There will be an examination for teachers in June, under the Teachers' Training Syndicate, and certificates will be granted for theoretical knowledge in teaching. Mr. Oscar Browning will keep a register of all the university men who pass the examination, and will act as a means of communication between them and head-masters who require assistants. With all the more confidence we may look forward to great advantages from Mr. James Ward's lectures on the Theory of Education next term, he having given high proof of ability as a physiologist.

THE Cambridge Natural Science Board announces that Prof. Hughes's lectures this term are on the Pre-Cambrian and Carboniferous rocks, while in palæontology, Mr. Tawney will lecture on Trilobites. Mr. Walter Keeping, B.A., continues his (open) lectures at Christ's College, on Rocks and Rock Masses, their Formation and Metamorphosis.

MR. HILLHOUSE is lecturing on botany in the lectures for women, and Mr. Walter Keeping on geology supplementing Prof. Hughes's lectures.

A NEW Cambridge medical association has been formed, and has obtained permission to meet in the old anatomical schools. Every effort will be made to render this association a most valuable means of advancing the interests of medical science in the University.

PROF. STUART and Mr. Garnett are the examiners in mechanism and applied science for the year.

THE law on the constitution of the high council of education in France is progressing favourably before the Senate. No other members will be admitted than professional teachers, except delegates of the five National Academies: Sciences, Beaux Arts, Française, Sciences Morales et Politiques, Inscriptions et Belles Lettres.

SOCIETIES AND ACADEMIES

LONDON

Royal Society, January 29.—"A Note on Protagon." By Arthur Gamgee, M.D., F.R.S., Brackenbury Professor of Physiology in Owens College, Manchester.

In this paper the author notices the allegations of Thudichum that protagon is an impure body containing more than 1 per cent. of inorganic matters, including no less than 0·76 per cent. of potassium.

He communicates a report from Prof. Roscoe, F.R.S., whom he requested specially to determine the mineral impurities and the amount of potassium in one of the samples of protagon, of which the analyses had formerly been communicated to the Royal Society.

By means of the spectroscope Dr. Roscoe determined the existence of a trace of potassium, which he estimated as equal to one-twentieth of a milligramme in one gramme of protagon (0·005 per cent.). Further, he found that on ignition protagon left a small quantity of fused metaphosphoric acid corresponding to 1·08 per cent. of phosphorus; the mean quantity of phosphorus deduced from the observations of Gamgee and Blankenhorn being 1·068.

"On the Physical Constants of Liquid Hydrochloric Acid." By Gerrard Ansdell, F C.S., Chemical Assistant at the Royal Institution. Communicated by Prof. Dewar, F.R.S.

In continuation of my former experiments on the properties of liquid acetylene gas, I have recently examined the physical constants of liquid hydrochloric acid. The gas was made by the action of strong sulphuric acid on dry chloride of ammonium, being afterwards freed from sulphuric acid and dried before entering the tubes.

The Cailletet pump was used in the same way as described in my former paper, two iron reservoirs being used, one containing the air manometer, and the other the tube with the gas to be liquefied.

Apart from the mere determination of the vapour tensions, densities, &c., the ratios of the volume of saturated vapour to that of the liquid was considered of the highest importance, as from these numbers the latent heat of transformation and other important data can be easily calculated. For these reasons the gas was examined in rather a different way to the acetylene, the volume to which it had been compressed at the point of liquefaction (or the volume of the saturated vapour) at any given temperature being first accurately determined, and then the pressure increased until the condensed liquid entirely filled the upper part of the tube. The volume of this liquid column was then measured, so that a comparison between the volume of the saturated vapour and the volume of the total condensed liquid was obtained at each temperature.

The results of the whole series of experiments are recorded in a condensed form in the following table:—

A.	B.	C.	D.	E.	F.
4	137·31	$\frac{1}{38·89}$	7·55	18·18	29·8
13·8	103·50	$\frac{1}{53·19}$	8·35	12·39	37·75
22·0	81·19	$\frac{1}{70·06}$	9·10	8·92	45·75
33·4	55·75	$\frac{1}{105·98}$	10·12	5·50	58·85
44·8	36·34	$\frac{1}{168·67}$	11·96	3·03	75·20
48·0	31·33	$\frac{1}{197·60}$	12·00	2·61	80·80
50·56	25·70	—	14·30	1·79	85·33
51·00	23 96				

In this table

A = temperature of gas.

B = volume of the saturated vapour at point of liquefaction.

C = fractional volume of the gas at point of liquefaction in relation to the initial volume under one atmosphere of pressure.

D = volume of the condensed liquid.

E = ratio of volume of liquid to that of the gas.

F = pressure in atmosphere.

The critical point was found to be 51°·25 C.

It will be seen from this table that the volumes of the saturated vapours and liquid gradually approach each other as the temperature nears the critical point, and would undoubtedly become identical, if the experiments could be carried on up to the critical point.

The ratio between the volume of the saturated vapour and the volume of the liquid at different temperatures decreases very regularly until within about three degrees of the critical point, where a singular point in the curve occurs, and the ratio approaches unity with great rapidity. The volume of the liquid increases very regularly up to a temperature of about 48° C., and at 51° C., or within 0·25 of a degree of the critical point, the distinction between the saturated vapour and the liquid vanishes, as although liquid is plainly seen to condense on the surface of the mercury, on increasing the pressure the line of demarcation immediately disappears, and it is impossible to say whether the tube is filled with the saturated vapour or the liquid itself; herefore no results could be obtained nearer the critical point than about a fourth of a degree.

Avenarius, in a paper entitled "The Causes which determine the Critical Point" ("Acad. Sci. St. Pétersbourg," 1876-77), made a number of experiment on ether, and came to the conclusion that the volumes of the saturated vapour and of the condensed liquid at the critical point were not identical.

My own experiments appear to confirm his results, in so far as it is evidently impossible to measure the relative volume of fluid and gas within less than a fourth of a degree of the critical point, and at this place the volumes are certainly unequal. This, however, does not disprove their identity as the critical point.

The density of the liquid at different temperatures was determined in the same way as described in my former paper, and gave the following numbers:—