some time now devoted to the elucidation of abstract propositions, and detailed elaborations in various forms of the same propositions, of no direct value, and some time now devoted to applications, which, designed to test the understanding, are really essentially numerical substitutions, so as to find leisure to supply physical problems as a test? The latter problems best serve to call forth a true knowledge of the principles. It is only in such application that we discover whether we have really grasped and actually secured the full meaning of the principle. So, too, in the course of physics as pursued in mechanical engineering schools, some details now studied, from force of habit and as being the regular thing in a complete course of physics, might, it appears to me, be advantageously omitted, and replaced by special and more extended work in heat, electricity, elasticity, and the like.

Surely, I trust, this will not be misinterpreted as a plea for the abandonment of study of abstract principles. The abstract principle is to be thoroughly studied, and the application is designed to insure the full comprehension of the principle. But why not select as far as possible, and dwell mainly on, such abstract principles, which can be re-enforced by these physical tests, and select such practical physical exercises, experience in which will re-act alike most directly to the comprehension of the abstract, and as desirable preparatory knowledge for the engineering course?

This is the only solution, if a four-years' course is to suffice; and, furthermore, it is in direct accord with the principle which underlies the engineering instruction, and which permits us to pay little attention to many fine important engineering devices, such as the printing-presses, agricultural machinery, and the like.

You will readily appreciate that this insertion of proper exercises, this working-out of special text-books and courses of study in the various elementary sciences, forming the foundation and most of the first two years' course of the mechanical engineer, applies to the several branches taught. I cannot burden this already too long address with details in the several departments; but there is, it appears to me, no great difficulty in discovering them when careful search is made.

If the point here emphasized would be borne in mind more steadfastly than is now the case, I believe time could be saved in the two later years, when the deficiency outlined must be then supplied as best it can, and some further exercises bearing on useful applications in design, and special lectures now crowded out, could find room.

If I have dwelt on the time available as an important factor in the educational problem, it is not to be interpreted as a favoring of undue haste. Better acquire some things thoroughly than a greater number superficially, for only in thorough acquirement can habits of correct observation and matured judgment be formed.

If I pointed out that in the two years' preparatory work of the course in an engineering school the general scheme seems to me, as far as I have been able to follow the matter, to be essentially the same during the past twelve years, while the fact of the rapid developments in applied engineering does make it important to consider some matters, at least from a general point of view, not necessary to consider at all twelve years ago, it is not to be construed as a sweeping criticism of this preparatory course. Such course is in my opinion, on the whole, admirable, but I believe it could be improved in the particular named. At the same time I am aware that a practising engineer, who only gives thought to these educational matters now and then, is apt to underrate the progress made; which progress may, in fact, be much greater than he anticipates, and perhaps even in the very line of the criticism advanced. If it be thus, so much the better that these words be uttered at the alumni meeting of the leading school of mechanical engineering in the country, where the presence of the faculty and their participation in the discussion will speedily lead to rectification of the error, if such it be, and to the enlightenment of those graduates and others who share the views just set forth.

In closing, let me emphasize that what I have said is meant to apply not specifically to our own alma mater, but to mechanical engineering schools in general.

THE conferring of degrees at the close of the twelfth academic year of the Johns Hopkins University took place June 14.

THE ETHNIC POSITION OF THE BASQUE NATION.

THE Basque or Euskarian people of the Pyrenæan and Cantabrian ridge are supposed to count at present about six hundred thousand souls. Four-fifths of them live on Spanish territory. They are well-proportioned in their bodies, but rather small, so that a large percentage have to be excluded from military service. Most of them are of a dark-brown complexion, although blondes are not scarce. Their faces are oval, their features agreeable, their general health excellent; and "to run like a Basque" has become a proverbial locution throughout the south-west of Europe. Among the Spanish Basques the dolichocephalic type is almost the only one observed. These and other ethnologic points form the introductory to a learned article by Prof. G. Gerland, 'The Basques and the Iberians,' inserted in the first volume of G. Gröber's 'Grundriss der romanischen Philologie,' one of the best encyclopedic works that ever appeared on the Romance languages of southern Europe (1886, pp. 313–334). The peculiar social and legal customs of the Basques, our author continues, make of them a people with archaistic survivals of various kinds, but do not by any means prove them to be an ethnologically isolated race. But their peculiar language shows them to be distinct from any other nationality. Some said that the 'Vascuence' was the language spoken in Paradise, while others believed "that even the Devil could not acquire this tongue." The sound *f* is wanting in all its dialects, and the language belongs to the agglutinative type. The radices are all monosyllables, or reducible to such, verbal roots being made clearly distinct from nominal roots. Basque is a pure suffix language, prefixes being unknown: even the definite article 'a' is postpositive. The language is not sex-denoting, except in the pronoun. The inflection of the transitive verb differs from that of the intransitive, but in both is mainly carried on by auxiliary verbs. The large number of verbal conjugations established by the earlier grammarians chiefly rest on the various direct and indirect pronominal objects that may become connected with the verb.

All these distinguishing traits of the language separate the Basque from the Celts as well as from the Romans; but whether they separated them also from the old Iberians is the problem which Gerland (and so many others before him) has tried to solve. The reports of the ancients upon the popular customs of the Iberians wholly coincide with what we know of the Basques of to-day; but a much more stringent proof lies in the fact that the ancient local names of the largest portion of Hispania, then inhabited by the Iberians, can be explained through the Basque language only. This region of Basque local names also extended over Aquitania in south-western France; and it is a striking fact in favor of this theory, that the present Gasconian dialect does not know the sounds *f* and *v*, for the Gascons are nothing else but Romanized Basques, and the tribal name of the ancient Ausci in those parts is the radix of the name 'Euskarian.'

That the Iberians, or ancient Basques as we may call them with Gerland, formed a unit as to their language and ethnic peculiarities, is evidenced by the fact that the Spanish language was evolved in homogeneous, uniform manner throughout the peninsula, whereas in France and Italy the ethnic difference of the inhabitants has produced dialects in the north and south which are opposed to each other, just as so many different languages. Although an immigration of Celts about 530 B.C. produced a race called Celtiberians, the manners and customs have remained Iberian with small modifications, and the dialectic differences among these were probably inconsiderable. Among the Iberian features which have impressed themselves upon the Spanish people, Gerland counts the bigotry and fanaticism of the Church, and the fondness for audacious, adventurous maritime expeditions.

While enumerating Basque terms which have found their way into the Spanish literary language, Gerland very pertinently remarks that barely one-third of these is found in the Portuguese, but that several had entered into the Hispano-Roman dialect at the time of the Roman domination. The Latin tongue has undergone less alterations in the Spanish language than in any other of the Romance languages of modern times. This is explained by Gerland by the fact that the Basque then spoken in the country was too heterogeneous for having much influence on the phonetics and morphology of the new language then in course of formation. The

late Prof. Fr. Dïez was of different opinion. He thought that Italian was that Romance language which formed the nearest approach to Old Latin. But there is no doubt that Spanish and Portuguese show considerable repugnance against the sound *f*, and that the double pronunciation of *r* in Spanish and Portuguese is identical with the one we find in Basque. Gerland also proposes the query, whether the softened *l*, *ñ*, *n*, so frequent in Basque, have caused the softening of *l* and *n* into *ll* and *ñ* of Spanish as well as of Portuguese, or whether this must be ascribed to other causes.

THE GREAT MARCH BLIZZARD.

THE great storm off the Atlantic coast of the United States of March 11–14 will probably go into history as the most severe experienced since this country has been inhabited by Europeans. Not only was it remarkable for its force and duration, but also for the unexpected manner of its appearance and development, and for the track it followed from the time it was first observed to that of its final disappearance.

No previous great storm at sea has been as thoroughly studied from such abundance of data as this very fortunately has been. From the time that the first vessel arrived in port which had encountered the storm at sea, to the present, the Hydrographic Office of the Navy Department has been collecting, arranging, and comparing all the reports in regard to it that have been received, and will soon publish a monograph giving a history of the great disturbance, illustrated by a number of carefully prepared maps and charts. Mr. Everett Hayden, who has had charge of the work, in a paper recently read before the National Geographic Society, gave the substance of what this monograph will contain. The following is an abstract of his paper.

Mr. Hayden began by referring briefly to the difficulties and delays that necessarily attend the collection of data by which to study the character and progress of a great ocean-storm, and illustrated these by stating the fact that a ship which recently arrived at New York from Calcutta supplied very valuable facts regarding one of the great hurricanes of August last, from a region to the westward of the Cape Verde Islands, where data were especially needed.

Four large colored charts were used to illustrate the meteorological conditions over the area charted (latitude 25° to 5° north, longitude 50° to 85° west) at 7 A.M., 75th meridian time, March 11, 12, 13, and 14 respectively. These charts contained isobars for each tenth of an inch, reduced pressure, and isotherms for each 10° F.; temperatures above freezing, in a tint of varying intensity of red; and below freezing, of blue. A large track-chart with vessels' positions and tracks enabled the audience more clearly to follow the discussion and the storm-reports which were quoted. A barometer diagram illustrated the fluctuations of the barometer at six land-stations and on board six vessels, selected with special reference to the completeness of their data, and their position relative to the storm. Diagrams were prepared, also, to show the varying height of the barometer along north-and-south sections, selected to emphasize the fact that the special feature of the storm was its trough-like form, the isobars about the area of low barometer being elliptical in shape, along a north-and-south line, and moving eastward between two ridges of high barometer.

The synchronous weather-charts were discussed successively. The first, that for 7 A.M., March 11, showed a trough of low barometer reaching from the Gulf far northward, past the eastern shore of Lake Huron, toward the southern limits of Hudson Bay. Off the coast a ridge of high barometer stretched down from the Gulf of St. Lawrence toward Santo Domingo, passing about midway between the Bermudas and Cape Hatteras. To the westward another ridge of high barometer extended from Dakota to below the Rio Grande. Along the coast the prevailing winds were therefore easterly and south-westerly; the warm, moist air drawn up from down within the tropics causing a warm wave, with generally cloudy weather and rain. In rear of the line of low barometer, a cold, north-westerly wind was blowing, carrying a cold wave far down into the Gulf, with frosts as far south as Louisiana and Mississippi, and cool northerly winds clear down to Vera Cruz.

Before considering the next chart, a description was given of the meteorological conditions off the coast, awaiting the advance of this long line of cold north-westerly gales, which was moving eastward at the rate of about six hundred miles a day. Attention was also called to the importance of considering, in this connection, the vitally important influence of the great warm ocean-current, the Gulf Stream, in increasing the energy of storms when they reach the coast. By way of more vividly illustrating the energy of action developed when cold winds blow over it, mention was made of the many water-spouts reported off the coast the last few months, and a few of those reports were quoted. It was shown, also, that the surface temperature in the axis of the Gulf Stream off Hatteras was as high as 76°, while that of the cold inshore current was fully 30° lower.

The storm was then followed as it approached the coast, its energy increasing every hour, and the barometric depression deepening. At 3 P.M., one centre, with pressure as low as 29.7, had just passed the coast south of Hatteras; while another, with pressure quite as low, or lower, was central over the Province of Ontario. Although the general trough-like form of the storm remained, as clearly indicated by reports from vessels all along the coast, yet another secondary storm-centre, and one of very great energy, formed offshore, north of Hatteras, as soon as the line had passed the coast. It was this centre, in violence fully equal to a tropical hurricane, and rendered still more dangerous by the freezing weather and blinding snow, which raged with such fury off Sandy Hook and Block Island for two days, — days likely to be long memorable along the coast. Its long continuance was probably due to the retardation of the centre of the line in its eastward motion, by the areas of high barometer about Newfoundland; so that this storm-centre delayed between Block Island and Nantucket, while the northern and southern flanks of the line swung around to the eastward, the advance of the lower one gradually cutting off the supply of warm, moist air rushing up from lower latitudes into contact with the cold north-westerly gale sweeping down from off the coast between Hatteras and Nantucket.

So far as the ocean is concerned, the night of the 11th–12th saw the great storm at its maximum, and its great extent and terrific violence make it to be one of the most severe ever experienced off our coast. Only a few corrected barometric readings were lower than 29, and the lowest pressure was probably not lower than 28.9, although lower readings were observed a few days later off the Grand Banks.

The chart for 7 A.M., March 12, showed the line or trough with isobars closely crowded together southward of Block Island, but still of a general elliptical shape, the lower portion of the line swinging eastward toward Bermuda, and carrying with it violent squalls of snow and hail far below the 35th parallel. The high land of Cuba and Santo Domingo prevented its effects from reaching the Caribbean Sea, although it was distinctly noticed by a vessel south of Cape Maysi, in the Windward Channel. The isotherm of 33° reached from central Georgia to the coast below Norfolk, and thence out into the Atlantic to a point about one hundred miles south of Block Island. Farther north, it ran inshore of Cape Cod, explaining the fact that so little snow, comparatively, fell in Rhode Island and south-eastern Massachusetts.

By next morning the storm was beginning to decrease in severity; and the chart shows that westerly winds and low temperatures had spread over a wide tract of ocean below the 40th parallel, while over the ocean north of that parallel the prevailing winds were easterly. The lower storm-centre was now in about latitude 40° north, longitude 39° west, with a pressure of 29.30; and the other a little distance south of a line from Nantucket to Block Island, barometer 29, the isobars extending in a general easterly and westerly direction. The delay of the storm off the coast, and its rapid increase of energy, had been shown in the most marked manner by the fluctuations of the barometer at land-stations and aboard vessels, and the barometer diagram was referred to by way of illustration.

March 14 the storm off Block Island had almost died away, with light variable winds and occasional snow-squalls; the other centre was about two hundred miles south-east from Sable Island. The great wave of low barometer had overspread the entire western portion of the North Atlantic, with unsettled, squally weather from Labrador to the Windward Islands. The area of high pressure in