should the ends to be attained be purely practical?

Necessarily also some large educational problems are touched which concern the whole school organization. Mention may be made of the new types of schools and of the subject of coeducation.

The committee proposes to examine anew and with care what are the branches of this science most able to contribute to general culture. What is the necessary minimum in arithmetic, algebra, geometry and trigonometry, as well as in descriptive and projective geometry, analytic geometry and the calculus? What new ideas must be introduced and what old ones should be discarded?

The much-discussed laboratory method of teaching mathematics requires close inspection. Are there not inconveniences and dangers that result? In what measure may the conventional limits which exist between certain subjects of pure mathematics be made to disappear? What have been the results of the attempts to teach algebra and geometry together? geometry and trigonometry? differential and integral calculus? Careful study needs to be made of the points of contact of mathematics with drawing, with the applied sciences, with philosophy, and with the problems of daily life.

To what extent should paper-folding, observational geometry, logarithms, graphics in algebra and the slide rule be used? Those who desire a close relation between mathematics and physics ought to show exactly what geometrical notions have a direct bearing on physics and to cite those problems of elementary physics which require simultaneous linear equations, equations of the second degree in one or more unknowns, irrational quantities and progressions.

To what degree is it possible to accord a larger place to the historical development of mathematics and to the history of the teaching of mathematics? The extensive literature on mathematical recreations might be made useful. What are the means which will give mathematics a better place in popular instruction and enable the subject to overcome popular prejudices?

The progress of teaching depends directly on the preparation of the teachers. So the committee believes that it will be useful to take account of the reforms, actual or projected, which have in view the training of teachers conformably to modern conditions. In this connection the sex of the teacher for different schools, the introduction of the teacher to scientific research, and the amount of character of the pedagogical training are questions of fundamental importance.

The high plane of this investigation is indicated by the scientific standing of the three members of the central committee as well as by the personnel of the American delegation. These men are announced by Professor Klein to be the following: Professor William F. Osgood, Harvard University; Professor David Eugene Smith, Columbia University; Professor J. W. A. Young, Chicago University.

Preliminary work is to be begun immediately; the commission as a whole to meet during the Easter recess of 1911 preliminary to making a final report to the International Congress of Mathematicians, which is to meet at Cambridge, England, in 1912.

Some may regard the work of the commission as initiating a great reform movement. Reform does not come by commission; rather this development emphasizes the great movement towards vital instruction which has been in progress for over a century. The important work of the commission will be to gather together the valuable contributions from all the world and to make them available to all the world. To select the good and discard the worthless is no small task but one well worthy of the best efforts of the leaders in mathematical thought.

L. C. KARPINSKI

UNIVERSITY OF MICHIGAN,
ANN ARBOR, MICH.

LIEUTENANT SHACKLETON'S ANTARCTIC EXPEDITION

THE Wellington, New Zealand, correspondent of the London *Times*, has cabled some details of the scientific results of the Shackleton expedition.

The frozen glacier-eroded lakes near Cape

Royds abounded in diatoms, rotifers, water bears and infusoria. Numbers of rotifers which were examined microscopically had been frozen into the ice at temperatures below zero for three years; yet after a few minutes' thawing out they suddenly revived and began eagerly devouring the fungus which abounds in these lakes. In some cases only the body, not the head, of the rotifer appeared to come to life. Several rotifers were similar to those already described by Murray as having been found at Spitzbergen and Franz Josef Land. The water bears came to life in the same manner.

On the black lava rocks of Mount Erebus which had absorbed the sun's heat the snow melted at temperatures below zero and at a height of 9,000 feet. This explains how lichens and similar plant life are enabled to flourish in the Antarctic regions.

The marine fauna near Cape Royds bears a resemblance to the types of animal life of the coal measure series found in Australia and Tasmania. Specimens will be examined by scientific specialists in New Zealand and Australia.

The northern expedition found masses of marine muds 40 feet above the sea level. These contained vast numbers of foraminiferal shells. The biloculina type, which form the biloculina ooze of the Arctic Circle, are specially abundant.

The geological discoveries disprove the Antarctic archipelago theory. The continental plateau extends from the newly discovered mountains 45 miles west of Cape Royds and the magnetic pole to beyond the south pole itself, probably over 1,800 miles. By far the most interesting geological discovery is that of coal measures in latitude 85°; these measures 1,500 feet thick, contain seams of coal 1 foot to 7 feet thick. The microscopic examination of the mineral charcoal which has been secured may indicate its geological age. Rounded quartz pebbles and the great thickness of the sandstone formation imply the action of running water prolonged through many ages. The limestone discovery at the farthest south, interstratified with a remarkable rock of pinkish gray, branded with dark green, unlike any that Professor David has ever seen, may prove important under microscopic examination. The ancient rocks examined apparently contain monazite.

Near Mount Larsen an interesting deep green mineral was found, which is almost certainly a compound of vanadium. Mount Erebus, like Stromboli, proved a good barometer, the steam column ascending and eruptions occurring with a low barometer. At periods the active crater contained molten lava. The old crater was filled almost to the brim with layers of snow. There are millions of felspar crystals 3 inches to 4 inches long, and pumice lava is of a rare kenite type. Fossil radiolaria were found in erratics of banded chert near Cape Royds. Lieutenant Shackleton is sending specimens of all these rocks to the British Museum. The exact location of the magnetic pole was fixed by elaborate triangulation by Mr. Mawson, extending over 200 miles from Mount Erebus to Mount Melbourne. It proved that the magnetic pole is no longer moving eastward as in Ross's time, but is now traveling northwestward in much the same direction as the north magnetic pole.

The summit crater of Mount Erebus was very active as regards steam and sulphur gases. No molten lava was seen, but during a big eruption in June and until September the steam column was glowing like a huge beacon fire, indicating that there was molten lava in the crater. Recently ejected "bombs" were found lying on the new snow, large quantities of sulphur being formed in the crater.

The coal measures discovered far south are probably older than the Tertiary Period; indeed, judging from the induration of the rock, they apparently date back to paleozoic times. No fossils to settle the point have been found, but a microscopic examination of the specimens may solve the problem.

THE RESIGNATION OF PRESIDENT ANGELL

THE regents of the University of Michigan have passed the following resolution:

This board has received with regret the assurance of our beloved president, Dr. James Burrill