

cally educated hands to execute, are now both required. Hence, popular education needs now to be characterized by industrial features, sufficient to give, at least, clear intimations of what the boys and girls are to do after they quit school.—*N. E. Journal of Education*.

4. THE UTILIZATION OF SOLAR FORCE.

A great deal of attention has of late years been devoted by French Scientists to the perfection of devices for utilizing solar force for economic purposes. It is a well accepted opinion that the most wonderful effects might be produced, if a means could be invented of employing the enormous power contained in the sun's rays, by the concentration of their energy upon a sufficiently large scale. The most careful calculations, which have been made to determine the amount of this power which our earth receives, show that the total quantity emanating from the sun and expended upon every acre of the earth's surface, or in the atmosphere above it, is equal to that represented by the continuous labour of one thousand horses. This force is partly employed in evaporating water, and producing atmospheric changes; it is partly absorbed by the organs of vegetation, and stored in the tissue of plants, and a part remains as heat in the surface of the ground to be radiated again into space when the night comes or the season changes. But although many experiments have been tried, no practical method has yet been devised for intercepting and utilizing this force at once on its arrival by applying it to mechanical purposes. Many scientific men, however, and especially the naval engineer, Ericsson, believe that this will some day be done, and that we shall cease to be dependent, as now, on the stored force received from the sun in former ages. Experiments have been made with a view to ascertain the practicability of so gathering and concentrating the solar radiance as to make it applicable to the purpose of driving machinery. Such concentration is necessary; for, though a force equal to that of a thousand horses is received within the area of an acre, that which would be included in any small area, like that occupied by the fixtures of a steam engine, would be too small to produce any mechanical effect. A few years ago a French mechanician succeeded by the use of reflectors in so collecting the sun's rays as to drive a small hot air engine by the heat derived from them. An American savant long ago demonstrated that the beams which fall on the roofs of houses in Philadelphia alone would suffice, if applied to heating engine boilers, to set in motion five thousand locomotives of 20-horse power each. A Frenchman, M. Mouchot has gone a few steps further towards solving the problem. He has already constructed and set up at Tours a new solar boiling machine, the uses of which were described the other day to the Paris Academy of Sciences. It consists of a brass cylinder, or, in French phraseology, an inverted skylight, measuring eight feet in diameter at its upper end, and three feet at the lower end, the distance between the top of it and the bottom being rather more than 2 feet. The convex sides of this gigantic kettle drum are plated so as to shine most brilliantly, and it is arranged so as to catch the full rays of the sun directly within its circumference. From the shining sides of the vessel they are, of course, reflected towards its centre, where there is placed upright a smaller brass cylinder filled with water, and protected by a bell-shaped glass dome, which allows the heat to enter, but not to go out again. With this machine there was obtained one hot day last July, a supply of more than thirty gallons of steam a minute, having a pressure of $\frac{1}{2}$ horse-power. Another use has been found, too, for the new heating agent. A saucepan can be put in the place of the smaller cylinder, and in a few minutes soup was obtained, free from all chance of smokiness and all taste of wood or coal fire. And if a cylinder of soup, why not other savoury messes? In the present overpowering heat the suggestion is full of interest. If we could but utilize a portion of the enormous surplus energy coming down from the meridian sun for culinary uses, how much more conducive to household comfort as well as economy in fuel. A great social question which at present vexes many would need no further solution.—*London Free Press*.

5. COMPARATIVE SIZE OF COUNTRIES.

Greece is about the size of Vermont.
Palestine is about one-fourth the size of New York.
Hindustan is more than a hundred times as large as Palestine.
The Great Desert of Africa has nearly the present dimensions of the United States.
The Red Sea would reach from Washington to Colorado, and it is three times as wide as Lake Ontario.
The English Channel is nearly as large as Lake Superior.
The Mediterranean, if placed across North America, would make sea navigation from San Diego to Baltimore.

The Caspian Sea would stretch from New York to St. Augustine, and is as wide as from New York to Rochester.

Great Britain is about two-thirds the size of Hindostan; one-twelfth of China, and one-twenty-fifth of the United States.

The Gulf of Mexico is about ten times the size of Lake Superior, and about as large as the Sea of Kamschatka, Bay of Bengal, China Sea, Okhotsk or Japan Sea; Lake Ontario would go in each of them more than fifty times.

The following bodies of water are about the same size: German Ocean, Black Sea, Yellow Sea; Hudson Bay is rather larger. The Baltic, Adriatic, Persian Gulf, and Aegean Sea, half as large, and somewhat larger than Lake Superior.

6. A BATCH OF WEATHER SIGNS.

In response to a circular sent to all the station observers by the chief signal officer, asking for the signs preceding storms, signal service observer Dumont has recently sent to Washington a report for his locality, based upon his own observations and the weather notes which Major Ingersoll had kept for several years, and foreman Allin's record. After detailing the action of the instruments before storms, the reporter gives the weather signs by which the approach of a storm is heralded, and these, by the way, are considered more reliable than the instrumental signs. Old weather prophets will be interested in comparing these rules with the maxims which they have drawn from their own observations. We append the signs:

1. As a rule, if the wind touches north-east or east for two or three days, it is a sure indication of rain.
2. Dense smoke and haze in early morning portend falling weather.
3. Summer showers of light character often follow two or three days of smoke and haze.
4. Fog, frost, and dew precede rain from twenty-four to forty-eight hours, except fog at close of a storm.
5. Wind veering from north or west to south and south-east, precedes falling weather.
6. Haloes, lunar and solar, also fairly defined and brilliant auroras, precede rain twenty-four to sixty hours.
7. Barometer rising or falling considerably away from its mean, forebodes falling weather, subject to modifying influences from the neighbouring ranges of mountains or hills.

7. HOW TO MAKE ENTOMOLOGISTS.

It is well known that in agricultural districts too little attention is paid to the thorough knowledge of the structure, habits and transformations of insects. Not until the potato beetle had committed vast depredations could the country be aroused to a sense of its mischievous power. In every garden and on every farm are numberless enemies to destroy the crops we have worked hard for and hoped to reap. Following their tracks are parasites that live on those same insects and help to save one's fruit or grain, flowers or root crops. How shall we, who have so many cares, rid ourselves of the pests and encourage the useful scavengers? The question is one of importance, and my answer to those interested is, engage the children in the matter, and give them credit for any discovery they may make in their researches. In every family are surely some members who best know the use of their eyes, and who have an inherent taste for natural history. Offer your children a prize for the best collection they may make during a summer, and you will be surprised to see the zest with which they will work.

There is nothing better than empty cigar boxes, a few small pieces of cork and a package of pins to make a boy's heart glad if he is inclined to catch and classify the beautiful butterflies that flit in every sunny garden. An old broom handle and a yard of mosquito netting are all that is required for a net; and it is astonishing to see with what alacrity children will run, when once fairly interested, to get "Harris on Insects," to learn the name or destructive nature of each new captive. An outbuilding would not be any the worse were a few well-known chrysalides to take up winter quarters therein. When the moth emerges from its prison children look upon it as one of life's miracles, and learn from mystery a pleasant and instructive lesson. There is nothing that escapes their observation, if early taught to use their eyes in this way, and many things are saved that would be destroyed and unobserved in our busy days if we had no young entomologists.

8. TEACHING KINDNESS TO ANIMALS.

BY M. DE SAILLY.

Wishing to aid, by the humble means in my power, the noble efforts of the societies whose mission is to improve the condition of mankind by protecting animals, I have undertaken, by bringing