

as pure silver, and has a density of 2.56; but when rolled or hammered, it becomes nearly as hard as iron, and its density is increased to 2.67. It is therefore one of the lightest known metals, being lighter than glass, and only one fourth as heavy as silver. It is also very sonorous; when a rod of the pure metal is suspended by fine wire, and struck, it sounds like a crystal bell.

Aluminum forms with copper, several alloys which are very hard and tough, being able to withstand wear far better than any other metal in use. An alloy of ten per cent aluminum and ninety per cent copper, forms so called aluminum bronze. It has a beautiful golden color which is retained in the atmosphere for a long time. On this account, it is much used for jewelry and other ornamental purposes. All grades of aluminum bronze make fine castings, because they take exact impressions so readily.

Aluminum increases very much the strength of all metals with which it is alloyed. The strength of common brass is almost doubled by the addition of two or three per cent of aluminum. It has been shown that the addition of one per cent of aluminum greatly improves the quality of iron, rendering castings more solid and free from blow-holes, and increasing the strength and elasticity very much.

On account of its very high price the first articles made of it were those of ornament and luxury. The very first article was a baby rattle intended for the young Prince Imperial in 1856. The largest single casting of pure aluminum ever yet made, is the tip of the Washington Monument. This casting is a pyramid in form, is ten inches high, six inches on each side of the base, and weighs only eight and one half pounds.

The beautiful color and the lightness of aluminum, and the ease with which it may be worked, assure for it a place among the useful metals. The various uses to which it can be put, were well illustrated at the Calcutta Exhibition in 1883. The exhibit consisted of such articles as wire, pens pencil-cases, railway-carriage fittings, locks and bolts, harness furniture in great variety; chandeliers and cutlery. It is also being used for the lighter parts of such instruments as galvanometers. "But perhaps its most promising field is for engineering, astronomical and optical instruments. Its use is extending slowly but surely, its cost being at present the principal obstacle to its wider employment."

The mineral cryolite found in Greenland, was the ore first used for the manufacture of alumi-

mun; but beauxite, a mineral found in France, has more recently employed with very good results. The only deposit of cryolite in the United States is found near Pike's Peak, Colorado, and costs nine or ten dollars a ton. A mineral called corundum is now much used instead of cryolite or beauxite. It will probably always be the chief source from which to manufacture pure aluminum, as it costs only ten dollars per ton, and is almost pure alumina. There is almost an exhaustible mine of corundum in Georgia, and about thirty smaller ones exist in Pennsylvania and North Carolina.

Mr. Charles F. Mabury of the Case School of Applied Science, says that until recently aluminum has been made chiefly by Duville's old method. "Several patents have been issued for its production by electrolysis, but there is only one electrolytic method that can be used on a commercial basis." Large works have recently been erected in France, for obtaining the metal by this method, and it is claimed that it can be produced for about seven dollars per pound.

Within the last few years the so-called Cowle's process, invented by two Cleveland gentlemen, has been brought into general use. The work done by their immense dynamos has been very satisfactory.

"The philosopher stone has not been sought with more eagerness than this cheap process." Chemists and practical metal workers, the world over, have experimented to this end for half a century, but so far, have not succeeded in reducing the cost to one dollar per pound. Until this is done, we can not expect to find aluminum in general use. "Frishmouth's process, if worked in a large plant, with suitable technical and practical management, and perfected mechanical and chemical means, will turn out unlimited quantities of the metal at the price above stated."

ESTELLA M. MURDOCH.

LIFE AND HER CHILDREN.

How many of us live day after day in this active world, and never once stop to look at the beauties and wonders of nature! Yet it is not necessary for one to journey far from his home to see Life's family, from the daintiest and simplest member, to the clumsiest and highest. Walk into some pleasant wood carpeted with mosses, ferns, and flowers, and watered by a peaceful little brook, murmuring gently as it ripples over the pebbled bottom; in this pleasant