

Science Revolutionizes Geography With the "Butterfly Map"

'Flattening' the Globe Without Disturbing Its Proportions Is the Newest Freak in Mapping Our World and Proving the Old Charts Are Absurd

By Henry Smith Williams, M. D., LL. D.

WHEN you see B. J. S. Cahill, the California architect, take in hand an ordinary rubber ball on which outlines of the continents have been drawn, making it like a school globe, your mind reverts to the geography class of your school days. You recall with what difficulty you grasped the idea that this flat-seeming world on which we live is really "round like a ball"; and how hard it was for you to associate the map on the globe with the flat map in your geography book.

You recall, too, that when you compared the map on the globe and the one in the book you found them very different. North America, for example, on the globe cuts rather a graceful figure, with a modest, birdlike head representing Alaska; whereas on the world-map this same continent is a top-heavy affair, with Alaska showing as a relatively gigantic bullhead. To this day you probably have not a very clear idea as to what is the actual shape of our continent and what are the true relative proportions of the United States, the Dominion of Canada and Alaska. And it is fairly certain that you have an utterly mistaken notion of the magnitude of Greenland and Iceland and Spitzbergen and of the Scandinavian Peninsula and the northern portion of the Continent of Asia.

But when Mr. Cahill, holding the rubber globe in his hand, makes a few incisions in it with his knife, and then spreads the globe out and flattens it under the glass of an ordinary photographic printing frame, you perceive something which reminds you of the old geography days, only by contrast. For now the map on the rubber globe has become a flat map, and you behold all the countries of the world at a single glance, as you never beheld them before, undistorted in shape and of the right relative size. The transformed globe is spread out before you as a map with four wings, giving it a shape which at once suggests the propriety of the name its inventor has given it—the Butterfly Map.

And after you get over marvelling, you exclaim: "How extremely simple. I wonder that I never thought of that." But you need not wonder. Simple things are not easy to think of. The most ingenious inventor usually develops complex mechanisms before he hits on the ultimate simplicity of design. And Mr. Cahill himself devoted a large part of his leisure time for twelve long years to the study of mapmaking, and had slowly evolved his now famous Butterfly Map, before the

thought of using a rubber ball to demonstrate the logic of his invention came to him. When the thought did come it came in a curious and interesting way. Mr. Cahill's little son was really responsible for it. He was playing with a rubber ball, while his father sat reading a newspaper at the breakfast table; and the ball chanced to fly across the room and hit Mr. Cahill on the head; then it fell and rolled along until it stopped, by accident—or through the manipulation of some good fairy—directly over a reproduction of the Butterfly Map itself which had been printed on a sheet of the newspaper that was spread out on the table. Mr. Cahill, his reading thus rudely inter-



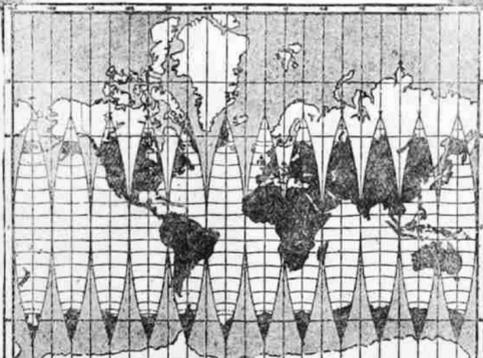
An Old "Map" of the Heavens and Earth as Conceived by Sebastien Munster in 1550.

rupted, rubbed his forehead, glanced down and saw the ball lying there on the map—and had his inspiration. He caught up the ball, seized a pen and rapidly drew a crude outline of the continents on the rubber surface; then—disregarding the protests of the owner of the ball—he sliced into the rubber with the blade of a safety razor and spread it out. And behold! He had duplicated the Butterfly Map of the newspaper. The rubber globe had become a Butterfly Map. Better still, when he took his hand away, the rubber, retaining its elasticity, sprang

back into shape, and became a globe again. And now he saw that he had a device which linked globe and map in a way to command the attention of any school child, removing the last element of mystification. To understand just how important Mr. Cahill's new map is, nothing more is necessary than to make a comparison between it and the world maps hitherto available in our geographies and atlases. If you will consult the first world atlas that comes to hand, the chances are that you will find that it shows the Mercator pro-

ACTUAL SIZE OF THE GLOBE WHICH THE MAP FORMS WHEN FOLDED

Below—Mercator Projection with Actual Gores of Globe Peeled Off and Laid Over it.



Mr. Cahill Demonstrating His Butterfly Map with a Globe Cut Open and Ready to Be Laid Flat.

jection. That is the world map which we all studied at school, as our ancestors had done for the past three hundred years or more. Comparing it with Mr. Cahill's Butterfly Map (which gives the true proportions), you will see what a weirdly distorted picture it gives of the continents. North America, for example, as you see it on this map, is as much a monstrosity as a picture of a man with a full sized lion's head on his body. It makes one think of those snapshots that you sometimes see in which a mammoth hand or a foot, all out of proportion, is projecting toward the camera. Alaska is shown as a gigantic territory, like a great head which makes the other part of the body represented by the United States and Mexico, seem puny.

And Greenland is a mammoth continent, apparently larger than South America. The real Alaska and the real Greenland are mere dwarfs in comparison. These distortions are necessary results of Mercator's plan, which, whatever its merits, involves fundamental absurdities. The difficulty is that the small polar regions are spread out just as wide as the equatorial region. The pole is, of course, an imaginary point, occupying no space at all; but in the map it is spread out to cover an east and west expanse equivalent to that of the equator. If a polar bear were standing just at the pole, and were depicted on the Mercator projection, he would extend right across the page—a beast twenty-four thousand miles long!

It could not be otherwise, because the location of any and every point is charted with reference to meridians of longitude which are actually drawn as parallel lines on the map, whereas in reality they are imaginary lines which steadily converge on the way from the equator to the pole, finally coming together at the pole itself. At the equator the successive meridian lines, each representing a degree of the earth's circumference, are a little over sixty-nine miles apart. Up toward the north, about ninety miles from the pole, these same lines are only one mile apart. Travelling straight east or straight west at this latitude, you would find the distance around the globe only 360 miles. Even if you go no farther North than Alaska, which lies mostly between the sixtieth and seventieth parallels of latitude, the converging lines of longitude are only about sixteen miles apart, so every mile of actual Alaskan territory becomes four miles or so on the map, and the territory as a whole is made fairly to rival the entire bulk of our fifty States, from Maine to California, though in reality you could drop the whole of Alaska into the Mississippi basin and have plenty of outstanding territory. All of this, of course, represents no new discovery. Mercator himself was perfectly aware of the inherent defects of his plan of map making. He felt merely that its advantages more than balanced the defects; and succeeding generations of geographers have agreed with him. Nevertheless many efforts have been made to improve upon his plan. But it can hardly be said that any one of these was signally successful until Mr. Cahill hit upon the novel plan of the Butterfly Map, which shows things as they are.

Large Picture at Left Shows You Why Architect Cahill Calls His New Flattened Globe a "Butterfly Map." Note Its Striking Resemblance to the Real Butterfly. Below, a Photo of the Inventor Himself, with the Rubber Globe Which Is Cut Along Three Great Circles to Produce the "Butterfly Projection."

