

## THE SILVER QUESTION GEOLOGICALLY CONSIDERED.

MANY questions of a social nature can be fairly claimed by the geologist as coming within his domain, but of them all none are so bound up with his problems as those that concern the currency. Theoretically, at least, all civilized money is made from certain metals, or is supposed to be their shadow. These metals owe their value to the skill and labor necessary to extract them from their hiding-places in the earth. It is a well-accepted principle in political economy that the value or purchasing power of these precious metals depends upon the amount of labor required in their production; their advantage over the so-called base metals, iron, copper, etc., depends upon their power to demand labor for production. A pound of gold is worth several thousand times as much as a pound of iron, because it requires several thousand times as much labor to win it from the earth. A pound of diamonds brings in the market several thousand times as much as a pound of gold, because a proportionally greater amount of labor is requisite to acquire them. In the complicated equation that determines the value of the mass of gold and silver in the world, there enter, of course, a great variety of minor causes, — the amount of use of these metals in the arts, the wear of handling, the loss by buried and sunken treasure, etc.; but these are elements of relatively small value in comparison with the cost of production. It is from this that the geologist comes to have a right to raise his voice when all the rest of the world is making a babel. His art, in good part, owes its beginnings to the painstaking inquiries that men have been making for centuries into the question of getting the greatest amount of gold and silver at the least cost of labor; and he alone can pronounce an opinion as to the future sources of supply and the chance that the world has of receiving an even share of precious metals, decade by decade and century by cent-

ury, for the time to come. A moment's consideration will convince any one that the geologist's verdict, if he can give one on this point, has an importance that it is hard to overestimate. The history of the coin metals shows that their value has been subject to constant change: whenever gold has received a sudden access of production, it has fallen in purchasing power; and in its turn silver has had its variations, and whenever, by the devices of coinage, these variations have been hidden, the whole currency based upon them has been subject to fluctuations that have changed the money value of the day laborer's toil and all that depends thereon. These changes were at best troublesome and wrong-working in their effects, but they generally took place slowly, while debts in the old days were commonly matters of short reckoning. But among the many contrivances of modern civilization we must count the system of deferred indebtedness, by means of which each generation passes on to its successors a large share of the burden of its deeds. The expenses of the wars of Great Britain, which have given the little island its world-wide empire, were fairly laid, in the shape of a national debt, as a tax upon its people for all time. Now the weight of this burden upon the production of the kingdom will vary with the value of its coin standards. If the purchasing power of the ounce of gold doubles, this burden will be doubled; if it sinks to one half, the debt will be laid as a tax upon its holders. In the case of such an empire, it may be said that this is equalized among its people, and that the unfairness is no greater than in the average of human experience; but in the case of corporations, such as railway companies, cities, etc., where the debt is not held at home, the unfairness that time may work is purely evil, quite without compensation. It is evident that the weight of the loads we put upon posterity through

the system of bonded indebtedness will largely depend upon the yield of precious metals in the time to come. If the earth can give enough to replace the wear and tear of these metals and the needs of widening use, these debts may remain the same; if the supply shrinks, the burden on the debt payers is relatively enhanced; if it increases beyond the measure of growing needs, the debt holder is in part shorn of his due. The only chance of answering this question concerning the future supply of coinable metal is through the study of the sources whence flow the streams of precious metals into the field of commerce, and here the science of the earth must be our guide.

Before the geologist can answer the question as to the probable yield of gold and silver in future, he must make clear to the inquirer the general character of the laws that regulate the distribution of metals in the earth's crust, and their gathering into the lodes, veins, beds, and other places of deposit.

The older theories concerning the origin of metalliferous deposits are exceedingly curious and quaint, wrought with superstition and enkindled by the imagination that is naturally bred in the mystery of the mine. Into this tangle of guesses and traditions the methods of science have gradually crept, but as yet hardly any of its discoveries have become matters of popular information; a large part of the most important results of modern inquiries as to the genesis of mineral deposits has not yet found its way into many text-books. The popular view of the origin of gold and silver deposits is that these substances are derived from the deeper stores of the heated interior of the earth, and that they have been sublimated thence and borne up into the overlying rocks; recent observations have materially modified this view. It is now believed that all the metals are contained in sea-water, and have been present in such waters ever since the oceans came down upon the lands. It is furthermore believed that these substances come into the sea-water by the same processes which bring common salt into the sea, namely, by the

leaching of the land by the rain-water, which, armed with the carbonic acid gas given it by the decaying vegetable matter of the soil, is able to seize a part of almost all the substances it finds in the soil or in the rocks, through which it penetrates, and bear its waste away to the deep in the condition of complete solution, as sugar is dissolved in water. In this state gravitation has no hold upon the dissolved metals, and the particles of gold or silver washed away from the rocks of any district may be scattered by the ocean currents to the most remote waters of the globe. In the sea lives a vast variety of vegetable life; each of these species, after the law of its kind, takes from the sea-water a share of the various dissolved matters which it holds, just as the plants of the land take various substances from the decaying rocks that constitute the soil. Certain sea-weeds take up more of one substance, and others another; dying where they grow and succeeded by their kind, they gradually build a rock composed in the main of the substances which they have separated from the sea-water. Some weeds, as for instance the Sargassum, grow afloat in the water and sweep with the ocean stream into great eddies, such as the Sea of Sargasso, and then slowly rot and sink to the sea floor. Some animals, feeding on particular species of marine plants, take to themselves in this way peculiar substances, and when they possess particular parts of the sea floor they too help to build up rocks rich in certain substances.

In time these beds, laid down by particular animals and plants in the slow events of life and death, become buried beneath thousands of feet of subsequent deposits. We then come to the last stage of the processes of making a mineral vein. The rocks becoming heated by means of the internal fires of the earth, the beds above serve as a blanket to confine the heat that is always escaping from the earth. These heated rocks are now traversed by hot waters, whose movement is, in part, impelled by the heat itself; these waters creep through the closest knit rocks, bringing about

manifold changes in them. As they go downwards, the waters are continually taking more and more heat from the rocks; and each increase of heat makes it possible for the water to seize on more of the various substances contained in the rocks. When its course is turned upwards towards the surface of the earth, the water begins to cool; in its slow passage through the narrow avenues of the veins in the rocks, it begins to lay down the substances it has taken up in the lower parts of its course. Although heated water will take up a number of substances while it is at a given temperature, it will lay them down in a successive order as it cools, so that it tends to assort them as it leaves them in its course towards the surface. This brings the various materials into the grouped order in which we find them in veins and other deposits. With a brevity that leaves much that it would be desirable to say unsaid, this is an account of the way in which veins are now believed to be formed. It is easily seen that here, as in all other earthly successions, substances tread an eternal circle in the guidance of water and by the impulse of heat. Through water impelled by solar force the metal is worked out of the crumbling rocks and borne to the sea; by organic life, itself the creation of solar force, it is borne back to the rocks; thence, in time, it is to be taken once again upon its ceaseless journeys. To man as a hunter of precious metals, those forces which serve to concentrate the disseminated metal into the open fissures of the rocks are matters of first importance. Out of the abundant facts and theories that the literature of the subject affords, we may select the following points which have for our purpose the greatest significance: It is only among the rocks which have been greatly changed by heat and the agents that work therewith that we find veins containing ores of gold. These rocks are generally among the older beds of the earth's surface, for the newer rocks have rarely received the deep burial which is necessary in order to bring the heat and other agents of change to bear upon them. These ancient rocks exist

everywhere over the earth, but of those parts of them that lie under the land more than nine tenths are so deeply buried beneath the newer beds, that bear no gold veins, that all access to their gold-bearing veins is cut off. Of the accessible area, equal to about one tenth of the land surface which has undergone enough metamorphism to bring its gold into veins, much is barren, for owing to the small amount of the metal brought into its rocks while they were being deposited on the old sea floors, or to some other cause, the amount of gold they contain in their veins is exceedingly small, — too small for profitable working. Such is the character of most of the New England region. Throughout this area we find in its older rocks veins which are meagrely supplied with gold enough to beguile industry to failure, and no more. The same may be said of Scandinavia, Switzerland, Great Britain, the Dominion of Canada, and many other regions, where rocks in all other respects sufficiently like those of our Golcondas bear no rich stores of wealth in their veins, though they all show some traces of precious metals. So that of the auriferous districts, as we may call all the regions where the veins show perceptible quantities of gold, probably not one third of the area affords any deposits which will give a profitable return for the labor of extracting the ore from its matrix, taking labor at the cheapest and gold at the dearest rate that they ever have coincidentally had in the history of mining.

There are yet large parts of the surface of the earth about which we know too little to form any opinion as to their resources in the way of precious metals. Yet we may fairly claim that more than one half the areas likely to contain gold have been to a greater or less degree explored. Europe, which has a relatively small area of possible gold fields, is already well stripped of its stores. No important discoveries of gold-bearing deposits have been made within fifty years, and despite cheap labor and governmental aid, the supply from its fields is steadily running down. The same may be said of the known Asiatic fields; a

large part of that continent likely to bear gold has never been thoroughly explored by any people likely to have cunningly sought for precious metals, but its old sources of supply, as well as those of Europe, are steadily failing. With the downfall of the Turkish empire it seems probable that many of the ancient mines may be restored to production, especially as by the modern methods miners are now able to penetrate where the old untrained workers were balked by difficulties. But at present those localities of the Old World which supplied the gold of coinage and the arts for all the centuries up to the sixteenth of our era are essentially unproductive. The sixteenth century set the world again in search of the Golden Fleece, and the Argonauts brought great stores from the New World. These stores were at first of gold, for with the natives of the Spanish American countries silver, if not unknown, was but little valued; but soon the new continents began to yield silver as well, and both the precious metals came from the western world in abundance. At first it was Mexico and the west coast of South America that furnished the supply, but gradually the productive area widened. The Brazilian field soon began to furnish great quantities of gold, and has retained a fair productiveness for over a century. The first half of this century saw the beginning of gold mining within the United States: the Dahlonega district, including the western parts of Georgia and the Carolinas and Central Virginia, began a moderate production which has served as a spur to imprudent investment ever since; the second half of this century saw the beginning of the Californian gold industry, and that equally fruitful field that has been given by the Australian archipelago. With this last discovery the gold hunters fairly finished their voyage around the earth. For centuries they have driven the flags of a dozen states against the darkness of the farther seas. In Australia they came at last back to the great district in which lay the Ophir of Solomon. The search for gold had now led to the discovery of

it on every continent and upon the shores of many of the great islands of the seas; every continent had now paid its golden tribute to man. Henceforth he must extend his supplies by closer searching in the fields already known to him, by more skillful processes, or a greater share of toil.

The possibilities of a greater extension of gold mining in the regions where men have long delved is the most important question the student of bullion production has to inquire into. He will first notice that every European source has been gradually shrinking in its supply. The Ural Mountains, the Hungarian mines, the sands of the river Rhine, the Spanish mines, — among the largest worked of any in the world, — have all been more or less steadily decreasing their yield, despite the wonderful growth in resources of mining and metallurgical arts during the past two centuries. The possible devices of the chemical and mechanic arts in the extraction and treatment of ores are doubtless well-nigh at their best, so we cannot expect any improvement in production on the continent of Europe. The British gold mines are regarded as hopeless failures by those most competent to judge of their resources. The mines of Siberia show the same steady decline. Hindostan and the neighboring islands, except Borneo, perhaps the most permanently productive of all gold areas, have shown no inviting field to the explorers. Africa has been a steady though small producer of gold, but seems to forbid the access of the outer world by almost insuperable obstacles, though there can be no doubt, from the little we know of its geology, that it presents one of the fairest fields for gold production in the future, as it has perhaps a larger proportion of its area underlaid by rocks of a gold-bearing stamp than either of the other continents. There can be little doubt that the gold veins of North America have already given us the cream of their gold production, or that which can be won at small cost, and what is hereafter to be obtained must be had at the expenditure of a much greater proportion of labor

than hitherto. The South American localities show no gain of recent years; Brazil reached its climax in the eighteenth century, and has been steadily decreasing since that time, until at present it gives but a small fraction of its greatest yield. The islands of the South Pacific have attained their climax, and they too are descending in the scale of production. Wherever we turn, the experience of mining for gold seems to point to the conclusion that the yield is essentially unstable, and that of metals which have been greatly sought for by man it is the one which can be least expected to give a steady and uniform return for the expenditure of a given amount of labor.

The paroxysmal nature of the gold supply in any district has been in part brought about by the fact that in each gold district the accessible store exists in two quite dissimilar conditions: first, in the shape of disseminated gold, the waste from the wearing of the lodes of the district, which on account of its weight is not readily swept into the sea, but remains as lumps in the sands of the rivers and pockets in their beds; and, second, in the shape of lodes or veins which yield their gold either in a metallic state or in various compounds with other substances. When a country is discovered to contain gold it is almost always these deposits of the first class that afford the first supplies. By washing the sands and grubbing in the pockets of the rivers a vast supply of gold, the product of the erosive decay of centuries, is won. After a few years of search the cream of these supplies is taken away, and the gold hunter must prepare to assault the sources whence they were derived, and with gunpowder, pick, and stamps make a costly imitation of the processes by which nature prepared for him the other store. Though great successes may here and there attend these efforts, it may be fairly questioned whether, counting the failures as well as the successes, there has been any gain of gold through these processes above a fair return upon the capital and labor invested. It is a reasonable conclusion from past experiences that

each gold district where veins are steadily worked will yield gold for a much greater time than it would from placer washings alone, but will yield it in a gradually diminished ratio to the labor expended. There is a vulgar idea that the supply of precious metals grows greater with the depth of the mines. This is not the case, as every extension of the works downwards is attended by an increase of the cost of production. Moreover, as the stored-up force of the coal beds is almost always remote from the source of supply of gold, the cost of lifting ore and water from deep workings soon becomes very great.

The question of future supply of gold is made more complicated owing to the introduction of what is termed hydraulic mining. In a certain sense hydraulic mining is the aboriginal method of procuring gold. Almost as soon as a people rise above the lowest levels of barbarism they begin to wash the gold-bearing sands of their streams, or at least to turn them over for their gold. The pan and the sluice, in their many simple modifications, have long been in use all the world over. To California is due the credit for the ingenious extension of this process, whereby the water, gathered at a higher level, is made to discharge itself in a concentrated stream through a nozzle against the clay or gravel cliff from which the gold is to be obtained. Thrown with the pressure of some hundred and fifty feet or more of head through a tube contracted from a foot in diameter or more to an aperture of two or three inches, these streams can daily tear away thousands of cubic yards of the toughest clays and cemented gravels. The ruin which the flood of water bears away is passed through long sluices into which quicksilver is poured. The quicksilver catches the fine gold as it passes by, and cements it into an amalgam which lies in the "riffles" or pockets made in the bottom of the sluice. This method greatly reduces the amount of labor involved in washing a given body of gravel or clay. The old-fashioned way of working required many times as much gold in the gravel in order to pay as does this

new method. The old washing processes were limited to the neighborhood of the streams, where the sands, having been washed and reworked by the rains, were rich in gold, and where they were not buried beneath a thick cover of unprofitable beds. The hydraulic method enables the miner to attack with profit the gravels remote from the streams, where he may have to tear away a cubic yard of material in order to win five or six cents' worth of gold. It has at the same time made him a very destroying angel. In all his varied search for hidden stores of wealth in the present and past, his ravages have been limited to the soiling of streams and blackening of the land; this last device enables him to tear away the very surface of the earth, reducing fair plains to deserts, and filling the rivers to their brim with the waste of the fields they once made fertile.

There can be no doubt that through this disastrous invention vast areas will be made productive in gold that have hitherto yielded little of this metal. So far it has been used only in California, where the conditions are not as favorable for its use as in many other countries. It seems likely that with the extension of this process to regions far richer in water, we may enter upon a brief period of unparalleled gold production. A considerable part of Vermont, where even now a man may make by the old ways of working a small wage for his labor, seems fitted for this base use. In the western parts of the Carolinas and Georgia, the rocks containing gold are decayed to a considerable depth, and in the old gold fields of Brazil and other tropical districts, where we find the same rotten conditions of the rocks characteristic of all regions beyond the domain of the last glacial period, this method will in time be applied. It is also likely that some of the abandoned workings of the Ural and Siberian mines may be advantageously worked by it. There can be no doubt that it will for a short time very greatly increase the amount of gold thrown into active use, and that with its extension we may fairly expect two great evils: the sudden increase of the

gold supply, tending to a fall in the purchasing power of the metal, and the devastation of some of the beautiful valleys of the world. After this period of spasmodic production we may anticipate a return to a steadily diminishing yield arising from the gradual exhaustion of gold found in lodes.

Let us now examine the conditions of occurrence of silver, the twin metal of currency with gold for nearly the whole of the coin period of human history. It seems pretty clear that the general history of silver is much the same as that of gold; it is known to exist in the waters of the sea in pretty large quantities, — so large, indeed, that it has been suspected that the sea gives up silver to the copper covering of ships, it being claimed that it is profitable to rework the sheathing of ships that have sailed many voyages, to obtain the silver they have taken up from the passing water.

The process of change that brings the dissolved silver of the sea-water into the deposits of the rocks, where we find it, is without doubt essentially the same as in the case of gold. There is, however, this peculiarity about silver: it is very frequently associated in considerable quantities with lead and with copper; in its association with the former metal it is often found deposited in districts where the evidence goes to show that the deposits have not required the intervention of highly-heated waters. The conditions favoring its occurrence in forms suitable for the miner's needs came about much more often in the workings of our earth's laboratories than in the case of gold. The result is that the area over which silver may be profitably sought is much greater than that over which gold may be searched for to advantage. In Europe, Norway, Saxony, Bohemia, Austria, Hungary, and Spain have continued the production of silver for centuries with a steadiness not equaled in any other mining industries. In the Peruvian and Bolivian districts of South America the yield has had something of the paroxysmal character common to all gold districts, but this irregularity is apparently due as much to bad

government as to any irregularity in the supply. Chili, where the government has been reasonably good, maintains a steadily increasing outpour of silver. There can be no doubt that in the future production of this metal the mines of the Andean district will be among the largest contributors. Mexico and the extension of the Cordilleras to the north and within the United States partake in the abundance of silver which seems given to the Pacific coast of the Americas in a singularly great share. By far the larger part of the silver furnished to the markets of the world has been from this great mountain chain. In three centuries the Potosi mines alone yielded over twelve hundred millions of dollars' worth of silver; and in the same time the Mexican mines poured out about twice this quantity. The other mines in this Cordilleran chain have brought up the sum somewhere near five thousand millions of dollars. The American continents are, it would seem, proportionately more richly stored with the ores of silver than those of any other metal.

Besides the silver-bearing beds which are rich enough in silver to deserve the name of silver mines, there are many mines, which are mainly worked for other metals, that still furnish considerable amounts of silver: most lead-bearing ores yield a quantity of silver that pays for the additional labor required to win it from its combinations; the same may be said of copper ores. Although these sources of supply are but moderate, they are constant, and in so far act to secure that steady production of the metal which is of the first importance to its use as a standard of value.

The relatively ready oxidization of silver, its relative lightness, and its unfrequent occurrence in disseminated grains account for the important fact that it is never found in river deposits or other places where it can be readily won by the miner. Furthermore, only a small part of the deposits that can be drawn upon in case of need have yet contributed to the supply of the world. Silver mining in Asia, Africa, and Australia can hardly be said to exist. There are,

doubtless, very many sources of supply yet untouched, as before noted. Most gold districts are first explored for gold which is scattered through their river sands; it is only at a later state of the prospecting that miners seek the lodes whence, by the wear of the surface, the scattered gold has been obtained. There are no such natural guides to silver deposits as there are to those of gold. It is only by rare accidents or careful prospecting that deposits of this description are found. It follows from these diverse conditions of occurrence of gold and silver that the former metal must be produced with far less steadiness than the latter. In 1854, Professor J. D. Whitney, the distinguished author of the work entitled *The Metallic Wealth of the United States*, sums up the careful study which he gives there of the sources of supply of these two precious metals in the following words: "Silver is, in a geological point of view, the metal best adapted for a standard of value, since, possessing all the valuable qualities that make gold suitable for that purpose, it is not liable to those fluctuations in its production to which this latter is exposed." The experience of the quarter century that has elapsed since this important conclusion, gained through the most painstaking labor, was announced has shown nothing to disturb the grounds on which it rests. The rapid rise and rapid fall of the supply from the California and Australia fields, then but beginning to yield their harvests; the invention of the hydraulic process, which threatens an inundation of gold greater than any that has yet occurred, point to the same conclusion, namely, that gold, essential as it is to our currency, is too irregular in its supply to afford, used by itself alone, the very first condition of a commercial standard. A currency measured in gold alone would run the fatal risk of profound oscillations of value, arising from the very great differences in the yield of this metal. There is hardly a product of human industry representing anything like such large value, the cost in labor of which has varied more within the last half century,

or is likely to vary more in the century to come, than gold. It is true that the volume of gold now in currency is so great that very considerable changes in the rate of production can take place without manifesting themselves in the purchasing power of the mass; but the drain made upon gold in the economic and æsthetic arts, always large, and increasing with each advance in wealth and luxury, requires a steady contribution to the trade reservoir of the metal to keep it from dangerous shrinking.<sup>1</sup> With every existing source of supply of a permanent nature decreasing, and with the promise of a series of spasmodic variations in production, arising from the extension of the hydraulic process to new areas, it is evident to the geologist that gold cannot be looked forward to as an embodiment of unvarying value.

Silver, on the other hand, gives a promise of steady yield in the future which is not afforded by gold. The sudden acceleration of production during the last few years, due in the main to the marvelous and unexampled extension of mining industry to the vast metalliferous region of the Cordilleras of North America, great though it has been, is not, considering the volume of silver, proportionately as disturbing in its effects as the inundations of gold from California, Nevada, and Australia have been. The Comstock lode is the accident of a century. Except for it the silver production of the Americas has had a singular steadiness during the last fifty years. The yield of this lode has, moreover, been about as disturbing upon the gold supply as upon that of silver, for over forty per cent. of its product has been in gold. The recent alarm about the overproduction of silver has been to a great extent founded on the production of this mine. Prodigious as this has been in the past, there is no reason to anticipate anything like the same yield in the future, and in

the centuries of search for silver on these continents, there have been but three sudden movements of production, — those which have come from the Potosi, the Mexican, and the Nevada mines. There is no evident reason why within a few years the production of silver should not again fall to its average rate. Owing to the extensive demand for silver in Asia, its rapid wear and its great use in table furniture, a very few years will fast drain away the existing surplus when the Nevada supply is withdrawn. Over a hundred years passed between the culmination of the silver production at Potosi and the period of greatest production in Mexico, and over fifty years between the time when the latter began rapidly to decline and the beginning of the prosperous days of the Nevada and Colorado silver mines. Each year makes it less and less probable that the world is to see new discoveries leading to such sudden movements of production. All the indications point to the steady yield of silver and to the unsteady yield of gold in the century to come.

RATE OF PRODUCTION OF GOLD AND SILVER DURING THE FIRST THREE QUARTERS OF THE PRESENT CENTURY IN MILLIONS AND TENTHS OF MILLIONS STERLING.

	Gold.	Silver.	
	Million £.	Million £.	
1800	2.6	7.7	Humboldt.
1809-29	1.6	3.6	Jacob. (Doubtful, probably an underestimate.)
1845	2.3	6.2	Whitney.
1852	36.5	8.1	Compiled by Sir H. Hay
1853	31.0	8.1	
1854	25.4	8.1	
1855	27.1	8.1	
1856	29.5	8.1	
1857	26.6	8.1	
1858	24.9	8.1	
1859	24.9	8.1	
1860	23.8	8.2	
1861	22.7	8.5	
1862	21.5	9.0	
1863	21.3	10	
1864	22.6	10	
1865	24.0	10	
1866	24.2	10	
1867	22.8	10	
1868	21.9	10	
1869	21.2	9.5	
1870	21.3	10	
1871	21.4	12	
1872	19.9	13	
1873	19.2	14	
1874	18.1	14	
1875	19.5	16	

Thus it is seen that within the century

<sup>1</sup> Mr. Ernest Seyd estimates the gold and silver now in use in the world as money as follows: —  
 Gold, full value . . . . . £750,000,000  
 Silver, full value . . . . . 505,000,000  
 Silver as "change" . . . . . 145,000,000  
 or about \$3,700,000,000 gold, and about \$3,300,000,000 silver.

the production of gold has varied about eighteen fold, of silver about two fold.

A very little consideration of this table will show that the variations in the production of gold and silver have served to neutralize the disturbing effect of the one on the other; the outflow of silver rising while that of gold decreases, and *vice versa*. Besides the ordinary action of chance that serves to bring about this effect, there is an especial influence which arises from the diminished profit coming from the depreciated price of the overproduced metal. This is seen at the present moment, in that many silver mines are not paying which would pay at the value of silver in 1860, and many other possible mines will not be opened while the value of the metal is falling. The effect of these causes on the total volume of currency metals gives a compensating correction to our standards of value which would not exist in case a currency of only one metal were used.

If silver is abandoned as a circulating medium by the civilized world, it will doubtless in time be forced out of use among the silver-consuming peoples of Asia, who for centuries have taken this metal in enormous quantities, putting it into ornaments and into buried hoards. Owing to the reduced field of its use, gold will then, with the present rate of supply, become worth more labor than it is now; the result will be an added stimulus to hydraulic mining, or a premium on the destruction of river-valleys that may be so unfortunate as to contain gold.

The total quantities of gold and silver in use in 1871 as coin and bars, held by banks or dealers, excluding utensils, ornaments, or buried hoards, is estimated by Mr. Ernest Seyd to be, gold seven hundred and fifty, silver six hundred and fifty, millions sterling. It would probably require all the gold produced in thirty more years, at the present rate, to replace the silver in the world's curren-

<sup>1</sup> It is worth while to trace the curious history of platina as a coin metal. Soon after its discovery in the Ural, in 1824, the Russian government began to coin it in pieces with a value of about five and ten dollars each. Though platina has always held a value much above silver, being now about five to one, and although several millions dollars of this coinage was made, it did not succeed, and was aban-

cy. At the average rate of production during the century it would require somewhere near the whole amount produced since 1800. The reader may imagine the disturbance to the value of gold that this would bring about. Probably it is easier to propose such changes than to effect them.

It is clear that there are no other metals which can ever be made to do satisfactory duty in a coinage as representatives of value.<sup>1</sup> The ancient choice of the world that, among all possible representatives of value, gold and silver should be money is fully warranted by the inquiries of those who have made the earth the subject of their special study. The geologist is naturally led, from his point of view, to doubt the policy of suppressing the old use of either of these metals. The peculiar convenience of gold lies in its capacity to pack a large amount of labor into a small bulk. Against this advantage must be set the irregular yield, and the destruction of rivers and their valley lands arising from the modern hydraulic process of extracting gold from aluminum. In favor of silver may be set the fact that it embodies much labor in a small mass, though in a less degree than gold. Its production in proportion to the amount in use is, in the long run, more steady than that of gold. It is produced by larger areas, and the mining industries it creates are more permanent. Furthermore, there is no risk of its search entailing the destruction of large tracts of tillable ground and the filling up of river beds.

The attentive student of the earth, seeing that only these two metals are fit for the peculiar uses of currency, may be permitted to doubt the policy of excluding either of them from the current use to which the common sense of our race has dedicated both from immemorial time. It is the especial task of the statesman to determine whether it is done after a quarter century of trial. The supply was deemed too unsteady and the public resistance too great to make the experiment worth continuance. After a quarter century of effort the scheme was abandoned. There can be no doubt that platina has more valuable qualities than either gold or silver. It is extensively disseminated, yet never likely to be found in permanent abundance.

possible to keep these two metals at work at the same time in making the exchanges of commerce. With this task the geologist, though he feels he has a right to meddle with many things, has clearly nothing to do. He may be at the most allowed to doubt whether the experience of the last decade has been sufficient to warrant the giving up of this effort at the adjustment of the diverse values of these metals, after thousands of years have shown that the world could manage to use them together. This question should not be connected with the remonetization of silver by the United States. The problem cannot be met by any individual state, especially in the way we have sought to meet it, without doing a bitter injustice to the rights of mankind, and sowing the seed of the very wrongs that it is the first object of all government to avoid. There is danger, however, that the present excitement concerning the silver question will commit the commercial states of the world to the sole use for currency of a metal of which the future is very doubtful; a metal liable to profound variations of value, — variations which would have already been much more damaging than they have been were it not for the fact

that the world has not been dependent on it alone for the actual volume and value of its currency. Commerce has had two good and faithful servants in these two precious metals. It does seem better to try to keep them both, despite the fact that they do not always pull together, rather than take the risks of putting all the work upon either one, especially when it is clear that either is liable to great variations in its power to perform its allotted functions. If they can be kept in use together, the variations in supply of the one are likely to counteract the variations of the other. These changes may require not infrequent changes in the relative value put upon these metals, and an accord thereon between the civilized states; but, perplexing as such matters of administration may be, it is better to face them than to run the risk of taking as the sole measure of exchange a metal which, from its tricky and uncertain ways, better deserves the name of mercury than its slippery companion. If steadiness in production over centuries of time is a necessary quality in the substance taken as a commercial standard, then gold is not to be trusted out of the company of its steadier-gaited companion.<sup>1</sup>

*N. S. Shaler.*

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#### SOME RECENT VOLUMES OF VERSE.

WE cannot see that the present time, when so few books of any sort are bought, is less abundant than the most prosperous season in books of verse. Possibly the publishers feel that one time is no worse than another for poetical ventures, and so launch themselves as fearlessly

<sup>1</sup> The literature having any distinct bearing on the problem proposed in this article is very limited, but the following titles may be found useful to the student: J. D. Whitney, *Metallic Wealth of the United States*, with brief accounts treating of the production of other countries; R. W. Raymond, *Reports on the Statistics of Mines and Mining in the States and Territories West of the Rocky Mountains*.

upon the flood-tide of adversity as if it led on to fortune. The poet's own part in the risk, if he is quite a new name, it is always pathetic to consider; though why it should be more pathetic to consider the loss of hopes than the loss of money we are not ready to say; and our

The Report from the Select Committee on the Depreciation of Silver to the Parliament of Great Britain, 1876 ("blue book") abounds in valuable matter. Also, for a discussion of the relations of organic life to the formation of ore deposits, see *Reports of Progress of the Kentucky Geological Survey*, vol. ii. (new series), part viii.