sults, the methods of arriving at them, often ingenious and depending on a refined analysis of the subject-matter, seem to us of decided interest to any who may be considering the part which mathematical methods are capable of taking in the development of economic science. We cannot here enter upon a discussion of this general question; but we may be permitted to say that we do not look forward to their giving important direct aid in the investigation of the fundamental questions of economics, though they may, when the science has reached a more advanced stage, be useful in the more minute discussion of special problems. In a certain indirect and incidental way, we think that mathematical inquiry may be useful even to the fundamental theory; for the necessity under which the mathematician lies, of clearly and exactly comprehending his premises, will doubtless in some instances bring about a more accurate view of economic phenomena. Upon the mathematical economists themselves, this necessity of accurate definition is apt to act in a most harmful manner, as their writings abundantly prove. When they have got hold of a notion which lends itself to mathematical treatment, the temptation is very great to unduly extend its province. Jevons's theory of utility in relation to value is a conspicuous example of these merits and defects. While the accurate analysis of some features of the phenomena of value which was a necessary preliminary to the mathematical discussion has been useful to economists in general, the results reached by the mathematical theory are open to the gravest objections; and this quite apart from any subsidiary defects, such as those occurring in some of Launhardt's discussions, as pointed out above. In the mathematical development of the theory, its exponents overlook two capital points, — first, that, under a *régime* of separation of employments, the direct utility of a product to its producer has little or no significance; secondly, that, when an addition to the amount of a given commodity supplies with it a new class of individuals who formerly could not possess it, the utility thus arising is very different — and, if measurable at all, its amount follows a very different law — from that which arises from an increase in the quantity possessed by those who were already provided with the commodity.

We have not left ourselves space to speak of other points, some of them very interesting, in the section on exchange, nor to make more than a passing mention of the other two sections, on production and transportation respectively. On the subject of money, the author takes, in our opinion, a very erroneous view. In the section on transportation, the mathematical premises come nearer than almost anywhere else to a representation of the actual problem: a large part of the questions there discussed are, in fact, such as are necessarily considered in an essentially mathematical way, though doubtless with little scientific method, by railroad managers. A satisfactory idea of the book can only be obtained by reading it. For the benefit of those who may contemplate doing so, we may state that a knowledge of the first elements of the differential calculus will make the little volume of two hundred pages sufficiently easy reading.

THE POPULATION OF MEDIAEVAL CITIES.

SOCIAL science has certain problems of reconstructing past conditions out of fragmentary remains, which are analogous to that reconstruction of terrestrial life and conditions which has been the triumph of modern natural science. History does not now content itself with a mere narration of events, but strives to portray the whole social condition of the people, — to give a vivid picture of society as it existed at the time. Modern historical writing has accomplished this to a greater or less extent, and the result is that our histories are histories of the people rather than of dynasties.

In one particular, however, this reproduction is incomplete. The historians do not give us exact statistical details of the relations of population, industry, commerce, etc., without which any description of a modern community would be considered entirely incomplete. It is impossible for them to do so, because such statistical investigations are entirely modern, most of them reaching back only to the beginning of this century. In former times there were no statistical bureaus, no census of the people, no returns of trade and commerce. There was no demand for such information, either for governmental or scientific purposes. It is notorious that ancient and mediaeval writers had no sense for numbers. The figures they give of the strength of armies or the population of cities are mere estimates, and on the face of them are often obvious exaggerations. One of the most difficult problems the historian has before him, is to weigh the statements of different writers as to the number of people concerned in any event, and very few purely literary historians have the requisite scientific training for such work.

The pure historian must here appeal to the professional statistician for help. The acute and learned work of which we give the title is an example of what German industry can accomplish

Die volkszahl deutscher städte zu ende der mittelalters und zu beginn der neuzeit. VON J. JASTROW. Berlin, *Gaertner*, 1886. 8°.

in this direction. It takes up the question of the population of mediaeval cities, and explains elaborately the methods of ascertaining such population. Of actual censuses of the people, we have but two cases, — Nuremberg, in 1449; and Strasburg, in 1475. The first was to estimate how long the corn would last during a siege; the second, to get at the military strength of the city. With these two exceptions, all our knowledge of the population of mediaeval cities rests on estimates of various kinds. Sometimes we have the number of houses in a city, and can guess at the population by reckoning the probable number of people to a house. The old church registers give the births, deaths, and marriages, and from these we can estimate the number of inhabitants. Finally, there are the tax-lists and the army-lists, occasionally a list of persons enjoying citizenship, or statistics of the consumption of the chief commodities. Our author points out, however, that all these estimates must be accepted very cautiously, because we are not accurately acquainted with the relations of mediaeval life so as to reason, for instance, from the consumption of meat in a city to the number of people.

The actual population of mediaeval cities appears from this scientific investigation to have been astonishingly small. Those imperial cities, which ruled themselves, bade defiance often to the emperor, and played an important part not only in the industrial but in the political life of Europe, we are accustomed to think of as places rich in wealth and population. In the fifteenth century, Nuremberg, Strasburg, and Dantzic, three very important commercial cities, probably contained less than 20,000 people each; Basle and Frankfort, from 10,000 to 15,000 each. In the sixteenth century Augsburg and Dantzic reached possibly 60,000; Nuremberg, from 40,000 to 50,000; Breslau, 40,000; Strasburg, 30,000; Leipzig, 15,000; and Berlin, 14,000. These were by far the most important cities of the empire. The other so-called cities were villages and market-places running down to from 1,200 to 1,500 people.

RICHMOND MAYO SMITH.

A VIENNA workman sick with sore throat was ordered a gargle of chlorate of potash. The prescription called for 'a coffee-spoonful in a glass of water,' although verbal instructions were given that it was to be used as a gargle. The wife of the sick man gave him a teaspoonful of the chlorate of potash dissolved in a tumbler of water, repeated the dose in an hour, and at four and again at five hours subsequently gave half a teaspoonful. After suffering with cramps and diarrhoea, followed by profuse perspiration, the patient became unconscious, and died the following morning, twelve hours after taking the first dose. Dr. Fountain, who did much to bring this remedy to the notice of the medical profession more than twenty years ago, in order to demonstrate its harmlessness, took an ounce, and died seven days after. Dr. Tully repeated this dangerous experiment on several occasions without any bad results. It is probable that the difference in the results in these two cases was due to the difference in the concentration of the solution.

— In 1884 there were 284,115,862 passengers carried by the railroads in New York City; and, as statistics show an annual increase of twenty millions in the number of passengers carried, the railroads should receive a total of at least 320,000,000 fares during the present year. At five cents each, this would give sixteen million dollars as New York's care-fare bill for 1886.

— The herring fishery in Scotland this year presents some features of interest. About a century ago the estuary of the Moray Frith was most sought after, and fishermen, both local and from a distance, caught large quantities of fish there. But in a most unaccountable manner the herrings suddenly disappeared about forty years ago, and were found only in shoals about the entrance of the frith and on the Caithness side. There, also, the inshore fishery became unproductive; and it was not until new haunts were discovered on the Dogger bank, from thirty to forty miles off the land, that the fishery again became abundant. On this bank heavy fishings are obtained, so that the produce of last year's fishing on the east coast was estimated at nearly $7,500,000. Meanwhile, Shetland had yielded but poor returns as a fishing-ground until 1877, when a beginning was made, and in 1885 the fish cured there amounted to 370,000 barrels. This year, however, the fishing at Shetland has been a comparative failure; but in the mean time the herring has returned to his old haunts in Moray Frith, and the fishing on the east side has of late been very successful. The total catch for the present year, up to the middle of August, is estimated at upwards of 250,000 barrels.

— A new method of preparing fresh fish for transportation to distant markets is being tried at North Sea fishing-ports. The fish are packed in steel barrels, in an antiseptic solution of three per cent boracic and tartaric acids and salt in ninety-seven per cent pure water, the liquid being forced in under a pressure of sixty pounds to the square inch. Fresh fish thus prepared are now supplied to the London markets from the Danish, Scottish, and Shetland Island fisheries.