from St. Thomas by a channel of 40 miles, with a maximum depth of over 2,400 fathoms, this plainly shows its connection with the northern islands of the Caribbean group, rather than with St. Thomas, as is also well shown by the geographical relations of its mollusca. The 500-fathom line again unites, in one gigantic spit extending northerly from the mouth of the Orinoco, all the islands to the south of Martinique, leaving Barbadoes to the east, and a narrow passage between Martinique and the islands of Dominica and St. Lucia. At the time of this connection, therefore, the Caribbean Sea connected with the Atlantic only by a narrow passage of a few miles in width between St. Lucia and Martinique, and one somewhat wider and slightly deeper between Martinique and Dominica, another between Sombrero and the Virgin Islands, and a comparatively narrow passage between Jamaica and Hayti. The Caribbean Sea, therefore, must have been a gulf of the Pacific, or have connected with it through wide passages, of which we find the traces in the tertiary and cretaceous deposits of the Isthmus of Darien, of Panama, and of Nicaragua. Central America and northern South America at that time must have been a series of large islands with passages between them from the Pacific into the Caribbean.

These results furnish an intelligible and at the same time trustworthy explanation of the peculiar geographical distribution of the fauna and flora of the West Indies. Instead of showing, as might naturally be assumed from their proximity to Florida, an affinity in their fauna and flora with that of the United States, the island of Cuba, the Bahamas, Hayti, and Porto Rico show unmistakable association with that of Mexico, Honduras, and Central America, while the Caribbean Islands show in part the same relationship, though the affinity to the Venezuelan and Brazilian flora is much more marked. The former geographical connections thus indicated are made certain by the Blake soundings.

THE FUTURE OF ORGANIC CHEMISTRY.

Berthelot has estimated the possible number of compounds of acids with alcohols at 1,400,000,000,000,000. With such a future before them ambitious young chemists need not despair of finding new compounds for centuries to come. The number of new bodies prepared annually will probably not exceed 1,000, but each year will see these numbers grow. Of all these new products less than 5 per cent have any so-called practical—*i. e.*, commercial—value. A majority, in fact, are never seen again outside of the laboratory where they are discovered, are never heard of after the first description has gone the rounds of the chemical journals, and been finally registered in the big year book, or Jahresbericht, into which are annually posted abstracts of all the minor entries that have been made in the various daybooks and blotters throughout the world. Yet each little discovery, insignificant though it may appear, every new body, useless as it may seem, is valuable. They are the bricks and stones from which a grand and imposing edifice is to be built, and while they may be allowed to lie for years in the rubbish heap, they will one day be sought out to fill their destined place in the structure. It is one man's place to provide the material, another to arrange them in position. As yet the outlines of the building are scarcely discernible; here a tower and there a pinnacle, then an ugly gap. In one place an imperfect foundation is settling and threatening ruin to the stories above; portions of it will need rebuilding; new corner stones are needed here and there; the glittering pinnacles have been misplaced, an overhanging turret threatens the passer-by. Future architects will change the plans, attempt new designs, but complete success is possible only after all the material is on the ground. Let no investigator feel that his little contribution is of no value; it may yet occupy a far more important position than those which for the present serve as capstones and cornice.

Aside from the theoretical value which attaches to these soon-to-be-forgotten compounds, it is worth while to prepare them and to study their properties carefully; it is impossible to prophesy what technical value they may possess or to what they may lead.

The question is often asked, Shall we ever be able to make the valuable alkaloids, particularly quinine? It is too soon to answer this question. A few years ago the synthese of coniine was announced, but it proved to be an isomeric body, a paraconiine. The next trial may give the real article, and then other alkaloids may follow. The recent success of an American in Paris, who prepared the glucosides synthetically, marks an important epoch in synthetical chemistry. The synthesis of cane sugar will probably follow, and who can say where this will lead to? Since the day when Woehler first made artificial urea, many useful forms of synthesis have been devised. Of these the most important commercially was the manufacture of artificial alizarine. Agriculture as well as technical industry was affected by it. Kolbe's synthesis of salicylic acid has proved a boon to suffering humanity. Tiemann's synthesis of vanilline, although much talked of, was necessarily of less importance from the relative small consumption of this flavor. Bäyer's recent synthesis of indigo is of no importance to the dyer at present, because his method is too circuitous and expensive, but it is no less the great achievement of a master mind. Another may modify his method and make it profitable.

The first step in the successful imitation of a natural product is to ascertain with certainty its constitution, into what products it is most easily separated, and how these again break up into simpler ones already known. Kolbe knew that salicylic acid could be readily converted into carbolic acid, carbonic acid being liberated. He reasoned, then, that if he could make carbonic acid act upon and combine with carbolic acid, salicylic acid would probably result. By the intervention of metallic sodium the reaction was accomplished, but sodium is too expensive a metal for such a purpose, hence he sought and found a cheaper one in caustic soda; what the latter lacked in energy was compensated for by simply raising the temperature.

The conversion of cane sugar into grape sugar (glucose) is a very simple affair, and has long been understood. The operation seems to consist in the abstraction of the elements of water. Could we not add the elements of water to grape sugar and convert it into cane sugar? As yet it has not been accomplished. The grape sugar has no desire to enter into a partnership with water on such terms as to form cane sugar. Carbon is a queer element, and we cannot always comprehend its idiosyncrasies. Anybody can convert a diamond into charcoal; no man has yet converted charcoal into diamonds. Yet why, we do not know.

Bäyer's synthesis of indigo blue furnishes a most instructive example of reversed operations. It had long been known that when indigo is oxidized with nitric acid *isatine* is formed. So Bäyer reasoned from this that he must be able to reduce isatine to indigo blue, and in this he succeeded by the aid of phosphorus and chloride of phosphorus. The next step was to prepare the isatine. *Oxindole* can be made from isatine, therefore Bäyer thought he could make isatine from oxindole, and after a few unsuccessful efforts he finally succeeded in making isatine. This completed his research, for he had already made oxindole from phenylacetic acid, which in turn is made from some of the coal tar products. The synthesis is complete, although tedious.

In addition to the wide field of pure synthetical chemistry, where coal tar is converted into true imitations of nature's own products, a field as yet but little cultivated, there is another scarcely yet explored—the conversion of one natural product into another and more valuable one, through purely chemical means. The conversion of starch into sugar, and that again into alcohol, is one which nature suggested and in which she assists. Sawdust is converted into oxalic acid and old rags into sweet sirups; but there are still other problems awaiting solution. Stearic acid is much more valuable than oleic. Who will convert the latter into the former? Oil of turpentine is isomeric with oils of bergamot, lemon, and lavender. Who will transpose the first into the others?

It cannot be denied that men have spent years—nay, a lifetime—on fruitless experiments; but the time is near at hand when *intelligent* work is sure to bring some reward, and although few secure great fame or wealth, still fewer go unrewarded. He who makes no experiments is sure to make no discoveries.

THE USE OF THE JEW'S EAR FUNGUS IN CHINA.

According to a paper recently read before the Philosophical Society of Wellington, New Zealand, it appears that a large trade is carried on between that colony and China in the fungus known as "Jew's ear." This trade is practically restricted to a single species, *Hirneola polytricha*, Mont., which is very abundant on decaying timber in all the forest districts. Small quantities only of this fungus were exported before the year 1872; in that year, however, the amount declared at the various ports in the colony was 57 tons 14 cwt., of the estimated value of $9,635; in 1877 it had increased to 220 tons 5 cwt., valued at $16,590, the total amount exported during the seven years ending 1878, being 838 tons, of the value of $189,060. The declared value of this fungus is about $220 per ton, or more than four and a half times the nominal price of one penny per pound paid by the merchant to the collector. As no process is required to prepare the fungus for market, the only outlay connected with it is the cost of collection and spreading in the open air or in sheds for a few days to allow of the evaporation of the moisture, and even this is rarely necessary in the summer, so that in round numbers the sum of about $40,000 represents the actual remuneration of the collectors, while the merchants' profit is represented by the disproportionate figure of $145,000. China is the sole market for this fungus. The use to which the Chinese apply it is as a medicine for purifying the blood, administered in the form of a decoction. It is also used on fast days, with a mixture of vermicelli and bean curd, instead of animal food. It seems to be likewise largely used in soups as ordinary food, and is sold at retail at about 25 cents per pound. An allied species, the common Jew's ear (*Hirneola Auricula-Judæ*), which also occurs in the colony, is decidedly rare as compared with the preceding one. Another species of *Hirneola* is collected in Tahiti, for export to China, and a larger species, found in northern China, is said to be extensively collected for home use. The paper above noted points out "the singular phenomenon of a product utterly useless in the country where it is found, being utilized by one of the least progressive people on the face of the earth, thus reversing the ordinary condition in which the civilized race utilizes the products of others less favored." The fungi mentioned in this paper belong to a section of the order in which the whole plant is of a gelatinous nature, becoming horny when dry, but swelling out again to its original form on the application of moisture. One of the species, *Hirneola Auricula-Judæ*, is widely distributed throughout Europe and the United States, and, a century ago, had much reputation in England as a strong purgative and topical astringent, and even now has some repute abroad, inasmuch as it appeared among the medicinal substances sent to the last International Exhibition at London from one of the French colonies. The faculty possessed by the fungus of absorbing and holding water like a sponge has resulted in its use as a medium for applying eye water to weak or diseased eyes, and similar purposes. Medical writers many years ago declared its internal use to be dangerous, and it was therefore rejected by the Edinburgh and London Colleges, and expunged from the pharmacopœias. The curious name that the plant bears is due to the ear-like form which it often assumes.

THE COST OF RAILWAY CARS.

Under examination by the State Committee on Railway Affairs, a leading member of one of our largest car building companies, Mr. Gilbert, testified that the average price of box cars is from $400 to $450. In 1872 they were as high as $1,200. A milk car costs about $100 more than an ordinary box freight car, that is, when the box is not changed. A baggage car truck and a passenger car truck are about the same. The price of a baggage car varies from $2,000 to $2,500. The cheapest style of Wagner's drawing room cars may be made for $8,000; the usual price is $12,000. This includes all the furnishing. The cheaper drawing room cars, four wheels, are made for $10,000. The ordinary mail car costs from $2,000 to $3,000; distributing cars more. Cars for the New York Elevated Road cost from $2,500 to $3,000. The last ordinary passenger cars built cost $4,200; the last built for the Hudson River road cost $5,400, including a heater and some extra fixtures. Small cars for carrying ore cost $200. Mr. Gilbert had never made coal cars or tank cars for oil.

Oliver Sarony.

Oliver Sarony, one of the pioneers in photography, and withal a successful and distinguished artist, recently died in Scarborough, England, in his sixtieth year. Mr. Sarony was born in Quebec, in 1820, and at an early age was thrown upon his own resources by the death of his father. With his brother Napoleon, so widely and favorably known as a photographer in this city, Mr. Sarony came to New York soon after his father's death. Becoming interested in the work of a daguerreotypist the two boys learned the art. In 1843 Oliver went to England, where he practiced photography with success and profit. In 1857 he settled in Scarborough, establishing branch offices in other large towns.

Professionally, Mr. Sarony's especial delight was to induce a customer to order an oil painted enlarged picture when his original purpose was to sit for a dozen cards. We have seen him engaged in such an enterprise, remarks the London *Photographic News*, and watched his almost child-like delight in the success of his efforts. Selecting the most pleasing of two or three negatives which had been taken, it was handed into a distinct department fitted up for rapidly producing transparencies. A transparency obtained, it was placed in a magic lantern kept ready, and a life-size image was thrown on the screen. Mr. Sarony had, in the meantime, invited the sitter and his wife into a gallery of life-size portraits well painted in oil, and handsomely framed. These, of course, elicited admiration, and eventually Mr. Sarony led his visitors into the room, where a fine portrait of the gentleman was presented life-size on the screen. The effect, as all photographers know, is very striking, and fully admits of a little eloquent talk on its fitness for painting. Mr. Sarony talked well and gracefully, with a frank candor that won belief; and on the occasion in question he took an order for an "oil" at sixty guineas.

The American Institute Fair.

The fair of the American Institute in this city opened on September 17. As usual very few of the exhibits were completely ready. The number of exhibitors this year is large, many applicants having to be turned away for lack of space, and there is promised an unusually full and interesting exhibition. A notable feature is an elaborate display of American china ware, under the direction of the National Pottery Association. The large exhibition of Agricultural machinery includes several novelties. Wood-working machinery is also well represented. The elevated railways have naturally called out many inventions for reducing noise and preventing accidents. The safety steam motor for surface roads, lately adopted by the Third Avenue Railroad, is exhibited, with the method of producing and applying steam power; also the compressed air motor of the Winters Improvement Company. A display of fruits, flowers, and vegetables is promised during October.

The Suez Canal.

One thousand five hundred and fifty vessels passed through the Suez Canal in 1878. Of these 1,227 were British, 89 French, 71 Dutch, 44 Italian, 38 Austrian, 22 German, 21 Spanish, 8 Egyptian, 8 Japanese, 6 Danish, 5 Swedish and Norwegian, 4 Portuguese, 3 Turkish, 2 Belgian, 1 American, and 1 Zanzibar. The total tonnage was 2,178,316 tons, of which 1,726,946 tons were British.

KEEP THE MOUTH SHUT.—The influence of nasal respiration on the ear is illustrated by Mr. George Catlin, in his history of "The North American Indians." Among two million Indians he found not one who was deaf or breathed through the mouth, except three or four deaf-mutes; and in the memory of the chiefs of 150 tribes, not one case of deafness could be remembered to have occurred. This is explained by the mother always closing the mouth of the child whenever it attempted to breathe through it.