

or instrumental work of any kind; although I have all that in my mind.

"Then the voice parts are written out by the copyist and the rehearsals begin; the composer, or in his absence, the accompanist of the theater, vamping the accompaniment. It is not until the music has been thoroughly learned, and the rehearsals on the stage—with action, business, and so on—are well advanced that I begin the work of orchestration.

"When that is finished the band parts are copied, two or three rehearsals of the orchestra are held, then orchestra and voices, without any stage business or action; and, finally, three or four full rehearsals of the complete work on the stage are enough to prepare the work for presentation to the public."

Meanwhile the full score has been taken, and from it an accompaniment to the voice parts has been "reduced" for the piano—this work has recently been undertaken by Sir Arthur's secretary, Wilfrid Bendall, himself a composer of numerous successful operettas and cantatas; so that the "words and music"—that is to say, the music for the piano and the voice part—are ready for the public by the time the piece is produced.

But the rapidity with which Sir Arthur Sullivan works is indeed surprising when one recollects the power, originality and beauty of the result. His first opera, *Contrabandista*, was composed, scored and rehearsed within sixteen days from the time he received the libretto. The overture to *Iolanthe* was commenced at 9 p. m. and finished at 7 a. m. the next morning. That to *The Yeomen of the Guard*—the opera which is now running as a revival in London—was composed and scored in twelve hours, while the epilogue to *The Golden Legend*, which for dignity, breadth and power—as a well-known critic once stated—stands out from among any of his choral examples, was composed and scored within twenty-four hours. Apart from the creative part of the work, such manual dexterity is indeed almost incredible.

Sir Arthur says that, although *The Mikado* and *Pinafore* would probably receive the popular vote, *The Yeomen of the Guard* was his own favorite work in light opera, because the story told is of more sustained and dramatic interest, and afforded him better opportunity for more sentimental and serious work.

Amusing stories are related of the rage which *Pinafore* created everywhere, although, curiously enough, it went very slowly at first. The rage extended to America, and in a newspaper of the time there is a notice to the effect that in one city alone 100,000 barrel organs were built to play nothing but *Pinafore*! "What, never? Well, hardly ever!" became a catch phrase of the most fearful type. One distracted editor found himself compelled to forbid the use of the phrase by his staff on pain of instant dismissal. "It occurred twenty times in as many articles in yesterday's edition," he sorrowfully said to them on one occasion. "Never let me see it used again!" "What, never?" was the wholly unanimous question. "Well, hardly ever," replied the wretched man.

### SCIENTIFIC MISCELLANY.

The steam-propelled aeroplane of Messrs. V. Tatin and Charles Richet has a very light silk-covered wood frame, to which are attached by steel wires, two similarly constructed fixed wings and a tail. A steam engine drives two screw propellers—one at each end—rotating in opposite directions. An experimental apparatus recently tested had about 14½ square yards of wing surface, weighed about

73 pounds, including water and coal for a flight of three miles, and developed a speed of 20 yards a second, the size and speed being considerably greater than those of Langley's aeroplane. The longest flight thus far has been about 150 yards, the machine having a tendency in its present stage to take headers. The start is made on a car rolling down an inclined plane 82 yards long, at the end of which the aeroplane is automatically released for free flight.

The accurate determination of the atomic weights is shown by Prof. F. W. Clarke to be a matter of real practical importance. The atomic weight of chromium is still placed by European analysts at the old determination of 52.5, while American chemists have adopted the corrected value of 52.1. A result is that chromic iron, which is imported by the Baltimore Chrome Ore works in cargoes of about 2,500 tons, is valued by Glasgow assays at \$367.50 per cargo more than by Baltimore assays.

The novel feature of the gas motor of Herr Diesel, of Munich, is stated to be the bringing of the fuel in the working cylinder into contact with air so highly compressed as to be intensely hot. The engine may be adapted to use coal dust, petroleum or coal-gas, the second form consuming about 0.55 of a pound of petroleum per horsepower hour.

The measurement of a degree of latitude in Spitzbergen is a Swedish project, Russian co-operation to be invited.

Much of the problem of life is intermingled with that of the vitality of seeds, which is still a matter of difference among biologists. Some hold that there is simply a slowing down of life in the dormant seed, imperceptible change and respiration continuing to take place; while others believe that the vital machinery is brought to an absolute rest for a time, to be started again when external conditions become favorable. In a recent Royal Society paper Messrs. Horace T. Brown and F. Escombe pointed out that the former hypothesis overlooks the remarkable evidence available. The late G. J. Romanes kept seeds fifteen months in a vacuum followed by an atmosphere of carbon monoxide, carbon dioxide, hydrogen sulphide, ether, chloroform, and other gases and vapors, and such treatment had little effect upon subsequent germination. There could have been no respiration of ordinary kind. In 1884 Pictet and C. de Candolle exposed seeds and microbes four days to a temperature of 100 degrees below zero C. without effect; and the authors have since been enabled by Prof. Dewar to keep seeds at 183 to 192 degrees below zero for 110 hours, still with no perceptible influence on germination. Chemical action being annihilated at 100 degrees below zero, molecular interchange in the protoplasm is likened by C. de Candolle to that of an explosive mixture, whose components can remain indefinitely in contact without combining until a certain temperature is reached.

A photographic apparatus for divers on submarine excursions has been devised by Senor Bortens, of Rio de Janeiro. It consists of an incandescent lamp with reflector in the diver's head-piece, and an ordinary camera enclosed in a rubber envelope having a glass front. Electricity for the lamp is supplied by a small dynamo in a boat above. Pictures are taken by pressing buttons through the rubber covering, and objects in Rio de Janeiro Bay have been photographed under water at a distance of ten or twelve feet as easily as in full daylight.

Hydrophobia has animal instead of bacterial origin, in the view of Dr. A. Grigorjew, a German biologist, who has isolated what appears to be a protozoan from patients suffering from rabies.

In dealing with chronic constipation, the bane of so many persons' existence, massage of the abdomen and electricity are expensive and require too much time, while drugs ordinarily soon lose their action, leaving the patient more constipated than before. Dr. Vladimir de Holstein of Paris, reports the best results from the use of creosote, which he supposes to have the effect—instead of that of a purgative—of neutralizing some toxin causing inaction of the intestinal tube. The creosote should be given pure in water or other liquid, beginning with a small dose—say a single drop—on account of the burning sensation, and increasing gradually to seven or eight drops, or even more if this proves insufficient. The dose is to be administered twice daily, after meals. The treatment is continued several months, and it is found not only to remove the constipation but to increase the appetite and improve the general condition.

An idea of the fearful slaughter of birds that is steadily going on may be had from the fact that on the 13th of last April nearly half a million birds were sold at an auction in London. These details of the consignment were given the *Selborne Society* by Mrs. Edward Phillips: Osprey plumes, 11,352 ounces; vulture plumes, 186½ pounds; peacock feathers, 215,051 bundles; birds of paradise, 2,362; Indian parrots, 228,289; bronze pigeons, including the gourd, 1,677; tangers and sundry birds, 38,198; humming birds, 116,490; jays and kingfishers, 48,759; Impayan and other pheasant and jungle fowl, 4,952; owls and hawks, 7,163. There was a similar sale in February, with others to follow in July and October.

Prussia now has 2,837 steam engines for electric generation of 191,935 horsepower, the number of engines having trebled in six years. Not less than 93 per cent of all the engines are used for electric lighting purposes.

### IN THE EUROPEAN MISSION.

[*Millennial Star*, Dec. 30, 1897.]

Arrivals.—The following named missionaries from Zion arrived in Liverpool, per American Line steamer *Rhynland*, on December 23, 1897: For the British mission—Thomas W. Jones, Robert W. Simkins, Lehl, Arizona; John H. Heap, St. Johns, Arizona; Heber Swainston, Whitney, Idaho; Thomas Blake, South Jordan; John S. Leatham, Wellsville. For the Scandinavian mission—Christian Christensen, Swan Lake, Idaho; Z. W. Israelson, Hyrum; Ole C. Jensen, Mayfield. For the Swiss and German mission—John M. Theurer, Providence; Gottfried Eschler, Thomas Fork, Idaho. The Elders for the Scandinavian and the Swiss and German missions continued their journey on the afternoon of the day they arrived.

Appointments.—Thomas W. Jones has been appointed to labor as a traveling Elder in the Welsh conference.

Thomas Blake and Robert W. Simkins have been appointed to labor as traveling Elders in the Manchester conference.

John S. Leatham has been appointed to labor as a traveling Elder in the Scottish conference.

John H. Heap has been appointed to labor as a traveling Elder in the Sheffield conference.

Heber Swainston has been appointed to labor as a traveling Elder in the London conference.