

## SCHUMANN'S SONATA IN A MINOR.

(MIT LEIDENSCHAFTLICHEM AUSDRUCK.)

The brilliant room, the flowers, the perfumed calm.  
The slender crystal vase where all aflame  
The scarlet poppies stand erect and tall;  
Colour that burns as if no frost could tame;  
The shaded lamp light glowing over all;  
The summer night a dream of warmth and balm.

Out breaks at once the golden melody  
"With passionate expression"—ah, from whence  
Comes the enchantment of this mystic spell,  
This charm that takes us captive soul and sense,  
The sacred power of music—who shall tell,  
Who find the secret of its mastery?

Lo, in the keen vibration of the air,  
Pierced by the sweetness of the violin,  
Shaken by thrilling chords and searching notes  
That flood the ivory keys, the flowers begin  
To tremble,—'tis as if some spirit floats,  
And breathes upon their beauty unaware.

Stately and still and proud the poppies stand  
In sullen splendour of superb attire:  
Stricken with arrows of melodious sound  
Their loosened petals fall like flakes of fire:  
With waves of music overwhelmed and drowned,  
Solemnly drop their flames on either hand.

So rare the moment dies, and what is left?  
Only a memory sweet to shut between  
Some poem's silent leaves, to find again,  
Perhaps, when winter blasts are howling keen,  
And summer's loveliness is spoiled and slain,  
And all the world of light and bloom bereft.

But winter cannot rob the music so!  
Nor time nor fate its subtle power destroy  
To bring again the summer's dear caress,  
To fill the heart with youth's unreasoning joy—  
Sound, colour, perfume, love, to warm and bless,  
And airs of balm from Paradise that blow.

CELIA THAXTER, in the January Century.

## THE GULF STREAM.

There is a river in the ocean. Its banks and its bottoms are of cold water, while its current is of warm. The Gulf of Mexico is its source, and its mouth is in the Arctic Seas. Its current is more rapid than the Mississippi, or the Amazon, and its volume more than a thousand times greater.

There is in the world no other such majestic flow of waters. Its waters, as far out from the Gulf as the Carolina Coasts, are of an indigo blue. They are so distinctly marked that their line of junction with the common sea-water may be traced by the eye. Often one-half of the vessel may be perceived floating in the Gulf Stream water, while the other half is in common water of the sea; so sharp is the line, and such the want of affinity between these waters, and such, too, the reluctance, so to speak, on the part of those of the Gulf Stream to mingle with the common water of the sea.

The cause of the Gulf Stream has always puzzled philosophers. Many the theories and numerous the speculations that have been advanced with regard to it. Modern investigations and examinations are beginning to throw some light upon the subject, though all is not yet clear.

Early writers maintained that the Mississippi River was the father of the Gulf Stream. Its floods, they said, produced it; for its velocity, it was held, could be computed by the rate of the current of the river.

Captain Livingston overturned this hypothesis by showing that the volume of water which the Mississippi River empties into the Gulf of Mexico is not equal to the three thousandth part of that which escapes from it through the Gulf Stream.

Moreover, the water of the Gulf Stream is salt—that of the Mississippi, fresh; and those philosophers forgot that just as much salt as escapes from the Gulf of Mexico through this stream, must enter the Gulf through some other channel from the main ocean; for, if it did not, the Gulf of Mexico, in process of time, unless it had a salt bed at the bottom, or was fed with salt springs from below—neither of which is probable—would become a fresh water basin.

The above quoted argument of Captain Livingston, however, was held to be conclusive.

But the opinion that came to be the most generally received and deep-rooted in the mind of seafaring people, was the one repeated by Dr. Franklin, and which held that the Gulf Stream is the escaping of the waters that have been forced into the Caribbean Sea by the trade winds, and it is the pressure of the winds forces up in to that sea a head, as it were, for this stream.

Supposing the pressure of the waters that are forced into the Caribbean Sea by the trade winds to be the sole cause of the Gulf Stream, that sea and the Mexican Gulf should have a much higher level than the Atlantic. Accordingly, the advocates of this theory require for its support, a great degree of elevation.

Now we know very nearly the average breadth and velocity of the Gulf Stream in the Florida Pass. We also know the velocity and breadth of the same waters off Cape Hatteras. Their breadth here is about 75 miles against 32 in the "Narrows of the Straits, and their mean velocity is three knots off Hatteras against four in the Narrows." This being the case, it is easy to show that the depth of the Gulf Stream off Hatteras is not so great as it is in the Narrows of Bemini by nearly 50 per cent., and that, consequently, instead of descending, its bed represents the surface of an inclined plane, with its descent inclined from the north toward the south, up which plane the lower depths of the stream must ascend. If we assume its depth off Bemini to be two fathoms, which are thought to be within limits, the above rates, breadth and velocity will give 114 fathoms for its depth

off Hatteras. The waters, therefore, which in the Straits are below the level of the Hatteras depth, so far from descending, are actually forced up an inclined plane, whose submarine ascent is no less than 10 inches to the mile.

It is a custom often practised by seafaring people to throw a bottle overboard, with a paper stating the time and place at which it is done. In the absence of other information as to currents, that afforded by these mute little navigators is of great value. They leave no tracks behind them, it is true, but knowing where they were cast, and seeing where they are found, some idea may be formed as to their course. Straight lines may at least be drawn showing the shortest distance from the beginning to the end of their voyage, with the time elapsed. Admiral Beechey, R. N., has prepared a chart, representing in this way, the tracks of more than one hundred bottles. From it, it appears, that the waters from every quarter of the Atlantic tend toward the Gulf of Mexico and its streams. Bottles cast into the sea midway between the Old and the New World, near the coasts of Europe, Africa and America, at the extreme north or farthest south, have been found either in the West Indies, on the British Isles, or within the well-known range of Gulf Stream waters.

Of two cast out together in south latitude on the coast of Africa, one was found on the Island of Trinidad, the other on the coast of the English Channel. Another bottle, thrown over off Cape Horn by an American master, has been picked up on the coast of Ireland.

Midway the Atlantic, in the triangular space between the Azores, Canaries, and the Cape de Verd Islands is the Sargasso Sea. Covering an area equal in extent to the Mississippi Valley, it is so thickly matted over with gulf weeds, that the speed of vessels passing through it is often much retarded. When the companions of Columbus saw it, they thought it marked the limits of navigation, and became alarmed.

To the eye, at a little distance, it seems substantial enough to walk upon. Columbus first found this weedy sea in his voyage of discovery. Exact observations as to its limits and their range, extending back for 50 years, assure us that its mean position has not been altered since that time. This indication of a circular motion by the Gulf Stream is corroborated by Admiral Beechey's bottle chart and other sources of information.

Assuming the maximum velocity of the Gulf Stream at five knots, and its depth and breadth in the narrows of Bemini, the vertical section across would present an area of 200,000,000 of square feet, moving at the rate of seven feet three inches per second—that is, sixteen hundred and fifty millions cubic feet would cross this section in a second.

It is safe to assume that the trade winds, by their constant force, do assist to skim the Atlantic of the water that has supplied them with vapour by driving it into the Caribbean Sea, whence, for causes unknown, it escapes by the channel of the Gulf Stream in preference to any other.

That the Gulf Stream is roof-shaped, causing the waters on its surface to flow off to either side from the middle, we have not only circumstantial evidence to show, but obstructions to prove.

Water, we know, expands by heat, therefore, the waters of the Gulf Stream lighter by reason of their warmth should occupy a higher level than those through which they flow, assuming the depth off Hatteras to be 114 fathoms; and allowing the usual rates of expansion for sea water, figures show that the middle of axis of the Gulf Stream there should be nearly two feet higher than the contiguous waters of the Atlantic.

Navigators, while drifting along with the Gulf Stream, have lowered a boat to try the surface current. In such cases, the boat would drift either to the east or to the west, as it happened to be on one side or the other of the axis of the stream while the vessel herself drifted along with the stream in the direction of its course. That such is the case is also indicated by the circumstance that the sea-weed and drift-wood which are formed in such large quantities along the outer edge, and for the simple reason that to cross the Gulf Stream, and to pass over from that side to this, they would have to drift up an inclined plane, as it were.

In its course to the north, the Gulf Stream gradually tends more and more to the eastward, until it arrives off the Banks of Newfoundland, where its course becomes nearly due east. These banks, it has been thought, deflect it from its proper course, and cause it to take this turn.

Examination will prove that they are an effect, certainly not the cause.

It is here that the frigid current and its icebergs from the north, are met and melted by the warm waters of the Gulf. Of course the loads of earth, stone and gravel, brought down upon them are here deposited.

Captain Scoresby, far away in the north, counted 500 icebergs setting out from the same vicinity upon this cold current for the south.

Many of them loaded with earth, have been seen aground on the Banks. These processes of transferring deposits from the north for these shoals, and of snowing down upon them the infusoria and corpses of living creatures that are spawned so abundantly in the warm waters of the Gulf Stream, and sloughed off in myriads for burial, where the conflict between it and the great Polar current takes place, is everlastingly going on. These agencies, with time, seem altogether adequate to the formation of extensive Cars or Canks.

The deep sea soundings that have been made by vessels of the navy tend to confirm this view as to the formation of these Banks.

The waters of the Gulf Stream as they escape from the Gulf, are bound for the British Islands, to the North Sea, and Frozen Ocean.

Many philosophers have expressed the opinion—indeed, the belief is common among mariners—that the coasts of the United States and the Shoals of Nantucket turn the Gulf toward the east. It appears that the course of the Gulf Stream is fixed and prescribed by exactly the same laws that require the planets to revolve in orbits, and that, were the Nantucket Shoals not in existence, the course of the Gulf Stream in the main would be exactly as it is and where it is. The Gulf Stream is bound over to the North Sea and Bay of Biscay partly for the reason perhaps, that waters there are lighter than those of the Mexican Gulf and if the Shoals of Nantucket were not in existence, it could not pursue a more direct route.

The Grand Banks, however, are encroaching and cold currents from the north come down upon it, they may, and probably do, assist now and then to turn it aside.

The current from the north which meets the Gulf Stream on the Grand Banks takes a southwardly direction; it runs down to the tropics by the side of the Gulf Stream, and stretches as far to the west as the shores of America will allow. Yet, in the face of these facts, and in spite of this force, both Major Renelle and McArango make the coast of the United States and the Shoals of Nantucket to turn the Gulf Stream towards the east.

As the Gulf Stream leaves the coasts of the United States it begins to vary its position according to the season; the limit of its northern edge, as it passes the meridian of Cape Race in winter, about latitude 40-41°, and in September, when the sea is hottest, about 45-46°. The trough of the Gulf Stream, therefore, may be supposed to waver about in the ocean not unlike a pennon in the breeze. Its head is confined between the shoals of the Bahamas and the Carolinas.

The reason for this change of position is obvious. The banks of the Gulf Stream are cold water. In winter, the volume of cold water in the American, or left side of the stream, is greatly increased. It must have room, and gains it by pressing the warmer waters of the stream farther to the south, or right.

In September, the temperature of these cold waters is modified; there is not such an extent of them, and then the warmer waters, in turn, force them back, and so the pendulum-like motion is preserved.

On a winter's day, the waters at the surface of the Gulf Stream off Cape Hatteras may be at 50°, and at the depth of five hundred fathoms—three thousand feet—as actual observations show, the thermometer will stand at 57°. Following the stream thence off the Capes of Virginia, 120 miles it will be found—the water thermometer having been carefully noted all the way—that it now stands a degree or two less at the surface, while all below is cooler. As a rule, the hottest water of the Gulf Stream is at, or near, the surface; and as the deep-sea thermometer is sent down, it shows that these waters though still far warmer than the water on either side at corresponding depths, gradually become less and less warm until the bottom of the current is reached.

Modern ingenuity has suggested a beautiful mode of warming houses in winter by means of hot water. How to compute small things with great, we have in the warm waters which are confined in the Gulf of Mexico, just such a heating apparatus for Great Britain, the Atlantic, and Western Europe.

The furnace is the torrid zone. The Mexican Gulf and Caribbean Sea are the caldrons; the Gulf Stream is the conducting pipe. From the Grand Banks of Newfoundland to the shores of Europe is the basement, the hot-air chamber—in which the pipe is flared out, so as to present a large cooling surface. The maximum temperature of the Gulf Stream 56°, or about 2° above the ocean temperature due the latitude. Increasing its latitude 10° it loses but 2° of temperature; and after having run 3,000 miles towards the north, it still preserves, even in winter, the heat of summer. With this temperature, it crosses the 40th degree of North latitude, and there overflowing its liquid banks, it spreads itself out for thousands of square leagues over the cold water around, and covers the ocean with a mantle of warmth that serves so much to mitigate in Europe the rigours of winter. Moving now more slowly, but dispensing its genial influences more freely, it finally meets the British Islands. By this time it is divided, one part going into the Polar basin of Spitzbergen, the other entering the Bay of Biscay, but each part at a temperature considerably above that of the ocean. Such an immense volume of heated water can not fail to carry with it beyond the seas a mild and moist atmosphere.

It is the influence of this stream climate that makes Erin the "Emerald Isles of the Sea," and that clothes the shores of Albion in evergreen robes; while in the same latitude, on this side, the coasts of Labrador are fast bound in fetters of ice. In a valuable paper on currents, Mr. Redfield states, that in 1831 the harbour of St. John's, Newfoundland, was closed with ice as late as the Month of June; yet who ever heard of the port of Liverpool, on the other side, though two degrees farther north, being closed with ice, even in the dead of winter.

To use a sailor's expression, the Gulf Stream is the great "weather breeder" of the North

Atlantic Ocean. The most furious gales of wind sweep along with it; and the logs of Newfoundland, which so much endangers navigation in winter, doubtless owe their existence to the presence, in that cold sea, of immense volumes of warm water brought by the Gulf Stream. Sir Philip Brooke found the air on each side of it at the freezing point, while that of its waters was 30°.

The nautical works tell us of a storm which forced this stream back to its source, and piled up the water in the Gulf to the height of 30 ft. The "Ledbury Snow" attempted to ride it out. When it abated, she found herself high up on the dry land, and discovered that she had let go her anchor among the tree tops on Elliott Key.

Several years ago the British Admiralty set on foot inquiries as to the cause of the storms in certain parts of the Atlantic which so often rage with disastrous effects to navigation.

The result may be summed up in the conclusion to which the investigation led: that they are occasioned by the irregularity between the temperature of the Gulf Stream and of the neighbouring regions, both in the air and water.

The habitual dampness of the climate of the British Islands, as well as the occasional dampness of that along the Atlantic coasts of North America when easterly winds prevail, is attributable also to the Gulf Stream. The Gulf Stream carries the temperature of summer, even in the dead of winter, as far north as the Grand Banks of Newfoundland.

The cause of many gales has been traced from the place of their origin directly to the Gulf Stream. Gales that take their rise on the coast of Africa, have, it has been shown by an examination, made straight for the Gulf; joining it, they have then been known to turn about, and, traveling with the stream, to recross the Atlantic, and so reach the shores of Europe.

In this way the tracks of storms have been traced out and followed for a week or ten days. Their track is marked by wreck and disaster. At the meeting of the American Association for the advancement of science in 1874, Mr. Redfield mentioned one which he had traced out, and in which no less than 70 old vessels had been wrecked, dismantled or damaged.

These storms for which the Gulf Stream has such attractions and over which it seems to exercise so much control, are said to be, for the most, whirlwinds. Mr. Fiddington, an eminent meteorologist of Calcutta calls them cyclones.

No part of the world affords a more difficult or dangerous navigation than the approaches of our Northern coast in winter.

In 1795 the Gulf Stream began to be as well understood by navigators as it is now, and the average passage from Europe to the north was shortened nearly one half, while those to the south remained about the same. Colonel Sabine, in his passage, a few days ago, from Sierra Leone to New York, was drifted 1,600 miles out of his way by the force of currents alone; and since the application of the thermometer to the Gulf Stream, average passage from England has been reduced from upward of eight weeks to little more than four.

Our double page illustrations this week are intended to trace the course of the Gulf Stream as herein described. Two maps, or charts, occupy the centre, the smaller one giving the course of the stream itself and its associated currents, the larger being a complete chart of the Atlantic with the various soundings in fathoms. Around this will be found engravings of the various countries where the coast is touched by the Gulf Stream, following its circuits from south to north and back again.

## MUSICAL AND DRAMATIC.

AN English version of *Odette* is shortly to be produced in London.

MME. MARIE ROSE had the honour of singing before the Queen at Osborne House a few weeks since.

MR. WILHELM GANZ, the well-known musician has been presented with the order of the Crown of Prussia.

ENGLISH papers comment upon the seeming indifference of theatre managers to the Vienna disaster.

SIG. NICOLINI seems anything but a favourite with the American critics. In fact, his voice is pretty well gone.

AN ingenious Frenchman has calculated that at a recent concert Patti got \$15 cents a word, and Nissini nearly \$1.

Two American ladies, Miss Bernetta of Cincinnati, and Miss Miller of Toledo, are distinguishing themselves as vocalists in Milan.

THE performance of Wagner's *Ring des Nibelungen* at Her Majesty's Theatre in May next will be given under the direction of Herr Sall of Leipzig.

A NEW play on a Russian subject, entitled "Vera; or, The Nihilists," by Mr. Oscar Wilde, has been performed at the Adelphi, London.

THE promised *recitativo* of Madame Sherrington at Mr. John Booney's Christmas Ballad Concert recently, was an event of much interest to her many friends and admirers.

HAYWARD'S YELLOW OIL will be found invaluable for all purposes of a family liniment. Immediate relief will follow its use in all cases of pain in the stomach, bowels or side; rheumatism, colic, colds, sprains and bruises. For internal and external use. It has no equal in the world for what it is recommended. For sale by all dealers at 25c. per bottle.