

PIERCING THE AMERICAN ISTHMUS.

WHERE shall be located and how planned the long-proposed ship-canal across the American Isthmus? This is the knotty question Ferdinand de Lesseps has prepared for an international congress of engineers, which assembles in Paris, on his invitation, as this paper comes from the press. The times and the auspices seem favorable to the project, which, through the action of the congress may reach a practical beginning. But since there will be two strong, opposing parties in the congress, the one favoring a canal carried over the Cordilleras, by means of locks, and the other, a canal piercing the mountain barrier, by means of a ship tunnel of unprecedented proportions, long and animated discussions must needs precede a satisfactory conclusion. The engineers and the capitalists are nearly agreed, however, that the canal is wanted and would be worth the hundred or perhaps hundred and fifty millions of dollars it will cost. Whatever this audacious century has thought worth its while to do, it has in the main done, and several times has "rectified the frontiers" of human possibility. It is no credit to the Pharaohs, with the pyramids of their ancestors in view, that they projected a canal across the Isthmus of Suez and succeeded in scooping out a shallow channel,—capable perhaps of floating a row-boat, had it not been buried, plans, hopes and all, under the shifting sands, leaving it to be unearthed and completed, in grand proportions, in our time by Frenchmen, who have ever been an affront to the accepted order of things, and in the pride of their new creations even scarcely regret having produced neither Shakspeare nor "Pinafore." The century still has twenty-one years in which to popularize flying among human bipeds and to build the interoceanic canal. But flying is not yet indispensable to human happiness, while nothing short of the Isthmus canal can fittingly crown the wonderful engineering achievements of the century. It is a scheme that appeals both to the practical sense and the imagination; it has long been the dream of the most eminent engineers, statesmen and economists; and perhaps even Balboa, planting his colony on the American shore of the Isthmus, and, advancing one day to the mountains concealing the un-

known west, may have vaguely entertained the project

"— when with eagle eyes
He stared at the Pacific, and all his men
Looked at each other with a wild surmise—
Silent upon a peak in Darien." *

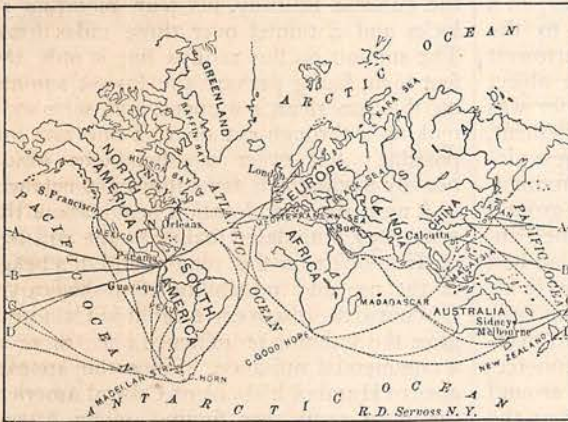
Within a few years the science of making geography to order has been remarkably developed. Holland almost set the fashion by giving Haarlem Lake up to agriculture, and since then has constructed a ship-canal, under great engineering difficulties, from Amsterdam Harbor direct to the German Ocean, making the Dutch metropolis independent of the circuitous and difficult course through the Zuyder Zee. De Lesseps comes next with his Suez Canal, triumphantly completed in the face of political opposition and in defiance of obstacles before regarded as practically insurmountable. Most important of all for the Darien project, the Suez Canal has proven a remarkable financial success, though it cost ninety-nine millions, about twice the amount first estimated. After it was opened in 1869, shares whose par value was 500 francs dropped to between 200 and 300 francs, while ten years afterward they are quoted between 700 and 800 francs. This canal shortens the voyage from England to India by 9,000 miles, yet the fact that British Oriental trade has been injured by it to the advantage of the great commercial cities of the Mediterranean testifies to the foresight of Lord Palmerston when he opposed its construction. The Darien project, on the contrary, met with his approval, and to-day appears to be the only expedient which would enable England to compete with France, Italy, Austria and Constantinople for the future Oriental trade of Northern Europe. The Mont Cenis and Hoosac tunnels demonstrate that man may safely drill his way through the rocky foundations of great mountain chains, and to this conclusion, the St. Gothard tunnel, moving with unexpected rapidity to completion, adds confirmation. Tunnels are soberly being planned to pierce the Alps under the Simplon Pass and to admit a railway under the English Channel. De Lesseps is maturing his scheme for flooding

* Keats, in ascribing the "eagle eyes" to Cortez, wrote better poetry than history.

the Algerian desert, confident that a vast inland sea once existed there and that it can be restored by cutting a canal through the sand-barrier of the coast, thus adding fertility and internal water communication to the French possessions in Africa. General Türr, president of the *Société Civile Internationale du Canal Interoceanique par l'Isthme du Darien*,—which holds a concession of rights in the Darien Isthmus for canal purposes and expects to be the nucleus of a new construction company,—is also interested in a project to connect the Adriatic and the Danube by a canal of ordinary capacity. The advisability has also been considered of a ship-canal across the Malayan peninsula,—the long narrow finger of land extending south from Siam to the Straits of Malacca. Such a canal, connecting the Bay of Bengal with the Gulf of Siam, would subtract 1,175 miles from the voyage between India and China. With this and the Darien project successfully ex-

Kelley, it is seen that the canal would make a saving in distance, from New York to San Francisco, of 14,000 miles; to Shanghai, 11,600 miles; to Canton, 10,900 miles; and to Calcutta, 9,600 miles. English commerce would be benefited by about the same saving in distance over the present Cape Horn route. Based on this saving of distance and the relative saving of time, and on the values of ships and cargoes that would have taken the canal route in 1856 and 1857, is the estimate that the Darien Canal, in reduced insurance, interest on cargoes, wear and tear of ships, freight money, wages, provisions, crews, etc., would produce an annual saving in money to the trade of the United States of \$35,995,930; to the trade of England, \$9,950,348; to the trade of France, \$2,185,930; or a total saving of about forty-eight millions of dollars, showing that the saving to commerce would pay for the canal in two or three, or at the outside four, years. The

tonnage which would have sought the canal in 1867-69 had fallen off slightly from the tonnage of 1857, which was 3,094,070 tons. A toll of \$2.50 per ton would have realized \$7,735,175 to the canal company. Add to this a charge of ten dollars per head on say 100,000 passengers, and it is roughly estimated that the receipts of the canal for the first year would be \$8,735,175, equal to eight and one-half per cent. on the cost of the canal if it were one hundred millions. But if the canal were to cost two hundred millions, there would still be, on this basis, an immediate return of four per cent., with the prospect of a rapid increase of the tonnage seeking the canal, as at



PLANISPHERE BY LIEUTENANT WYSE, SHOWING HOW SEA VOYAGES WOULD BE SHORTENED BY THE ISTHMUS CANAL. [THE DARK LINES INDICATE PROPOSED ROUTES; THE DOTTED LINES, PRESENT ROUTES.]

ecuted, a voyage around the world could be made, also *via* Suez, without crossing to the south of the equator, keeping, at the same time, between the eighth and thirty-seventh parallels. Unlike these other already successful or proposed engineering schemes, the Darien Canal will lie in a climate the most unfavorable to the health of the laborers employed, and where tides and floods and a long season of copious rain-falls place new and serious difficulties in the way of mountain tunneling, or the construction and maintenance of ship-locks of unprecedented size. But the reward of success will be proportionate to the difficulties and the cost. From computations made by Frederick M.

Suez. Capitalists see that, with the greater share of the commerce of the world necessarily paying tribute to the canal, since it would be without a competing rival, it would be one of the best paying investments the world now offers, even at a cost of two hundred millions. While greatly benefiting Europe, it would place America incontestably in the center of the world's commerce; and, as a writer in the "Edinburgh Review" once said, the success of the scheme would mark "the mightiest event in favor of the peaceful intercourse of nations which the physical circumstances of the globe present to the enterprise of men."

The one circumstance in the project which

most favors its at least being undertaken, is the fascination it has always exercised over intelligent and enterprising minds. Practical statesmen and hard-headed financiers have won back the glow of youthful enthusiasm in contemplating the scheme. Men have spent thousands of dollars in their zeal to carry forward the idea, a hope of reward usually being mingled with their thirst for honorable renown. A small library has been written on the subject, in support of the general scheme, or advocating or attacking particular routes and plans. American engineers, the most prominent of them officers of the army and navy, have made the most important scientific contributions to the project. The French, through the recent explorations of Lieutenant Lucien N. B. Wyse, of the French navy, assume the second rank as explorers, and now come to the front as promoters. Englishmen have made important explorations, and have always given encouragement to the enterprise.

It is a singular fact that Columbus, in a direct westerly search for a route to the Indies, happened nearly upon the narrowest strip of land barring his way to the object of his ambition. And on this barrier was made almost the first American settlement, and twenty-three years later (1532), these pioneer Spaniards established a line of communication with the Pacific coast, on the ground that to-day supports the sleepers of the Panama Railway. By this time Magellan had already discovered Cape Horn (1520) in his successful effort to turn the flank of the Isthmus, while Vasco da Gama, seeking to overcome a similar obstacle to eastern commerce,—the Isthmus of Suez,—had passed around the Cape of Good Hope; and it was the dream of a north-west passage that led Sir John Franklin to his fate in Arctic seas. Who can doubt that the same powerful incentive which inspired these voyages of discovery will result in cutting a channel through the Isthmus? At an early day the Spaniards had hopes of being able to connect the harbors on both sides of the Isthmus by means of a short canal as a connecting link between the head-waters of the numerous rivers emptying into these harbors. But when gold mines were discovered in Darien, to screen them as much as possible from the rapacious adventurers of other nations, Philip II. ordered all surveys and maps under lock and key. A century later, the English and French buccaneers pillaged Mexico and Central America, and, for a time, made Spanish possession of the Isthmus little more

than a name. But that these early Spaniards had wonderful engineering resources is proven by the Mexican Desague, a vast aperture two miles long, 300 feet wide, and 100 and 200 feet deep, which, two or three hundred years ago, was cut through the mountain range bounding the Mexican plain on the north-west, in order, it is supposed, to permit the escape of inundating floods. Of this Humboldt says: "In its actual state it is undoubtedly one of the most gigantic hydraulic operations ever executed by man." Malte Brun, in his classification, mentions nineteen distinct proposed canal routes, and French exploration has since added another. Humboldt mentions that about 1771 attention was drawn to the Tehuantepec route, by the discovery in the port of San Juan de Ulloa that cannon cast at Manilla had been transported across that isthmus *via* the rivers Chimalopa and Coatzacoalcos. In 1843, M. Garella made a survey for a route near the present line of the Panama Railway, his plan requiring 35 locks and a tunnel over three miles long. The summit on the railway line is only 286 feet high, being perhaps the lowest summit on the American continent, and seemingly making a through-cut on this line not impossible; but other disadvantages weigh heavily against this favorable circumstance.

A new era of exploration began about the year 1850, stimulated mainly by the writings of Humboldt on this region, and his belief in the use and possibility of a ship-canal. Of course the discovery of gold in California gave the Isthmus prominence once more as a commercial nuisance. Since the appearance of Humboldt's book on Central America, the most prominent figure, among Americans, in pushing forward the enterprise has been a private New-York gentleman, Frederick M. Kelley, then a young banker in Wall street. For several years Mr. Kelley alone held the concession now owned by the French company; he has spent his private fortune of one hundred and twenty thousand dollars in promoting the enterprise, to which he may still contribute energy and experience, the French company having shown some disposition to recognize his services. Americans are well acquainted with the man of great projects and speculations of whom "Colonel Sellers" is the comedy type. Mr. Kelley's experience is flavored with a kind of romance and a great deal of American self-confidence and business audacity, and well illustrates the varied fortunes of men who, looking in advance of the times,

give their lives to the task of making their fellow-men see as they do.

During the gold excitement, Benjamin Blagg, a New York merchant, started for California, but was led off into the valley of the Atrato in New Grenada, or the States of Colombia, by rumors of gold deposits to be found in that quarter. The gold-washing being unprofitable, it occurred to him to make practical use of Humboldt's statement, that one hundred and fifty years before, a priest living at Novita had directed his parishioners in the construction of a canal, since fallen into decay, across the narrow Raspadura Divide, or San Pablo Isthmus, thereby connecting the head-waters of the San Juan, flowing into the Pacific, with the head-waters of the great Atrato, emptying into the Gulf of Darien or the Atlantic (see map). It was believed also that the Indians had used this route for a canal passage, between the two oceans, for centuries, drawing their bungos over the divide, on which the waters of the Atlantic and Pacific water-sheds, in the form of rills, can be traced to within a few rods of each other. Blagg hastened to Bogota and obtained from the Colombian government a concession giving the exclusive right to construct and operate a canal connecting the Raspadura Creek with the head of bungo navigation on the San Juan. He then came back to New York and, supported by Humboldt's statement, made a sale of this concession to Mr. Kelley and several of his Wall street associates. John C. Trautwine was placed at the head of an expedition to explore the Atrato River from its mouth up to the Quito branch, by that to the Raspadura Creek, thence over the summit and down the San Juan to the Pacific. When the expedition started, the twenty-four shares in the company, worth \$1,000 at par, rose in the imaginations of their holders to \$50,000, but "tumbled out of sight" when the engineers reported that the route was not practicable, and that so far as they could learn, or discover on the ground, the Raspadura canal was a myth; though it was a fact that the Indians frequently pulled their bungos over the divide.

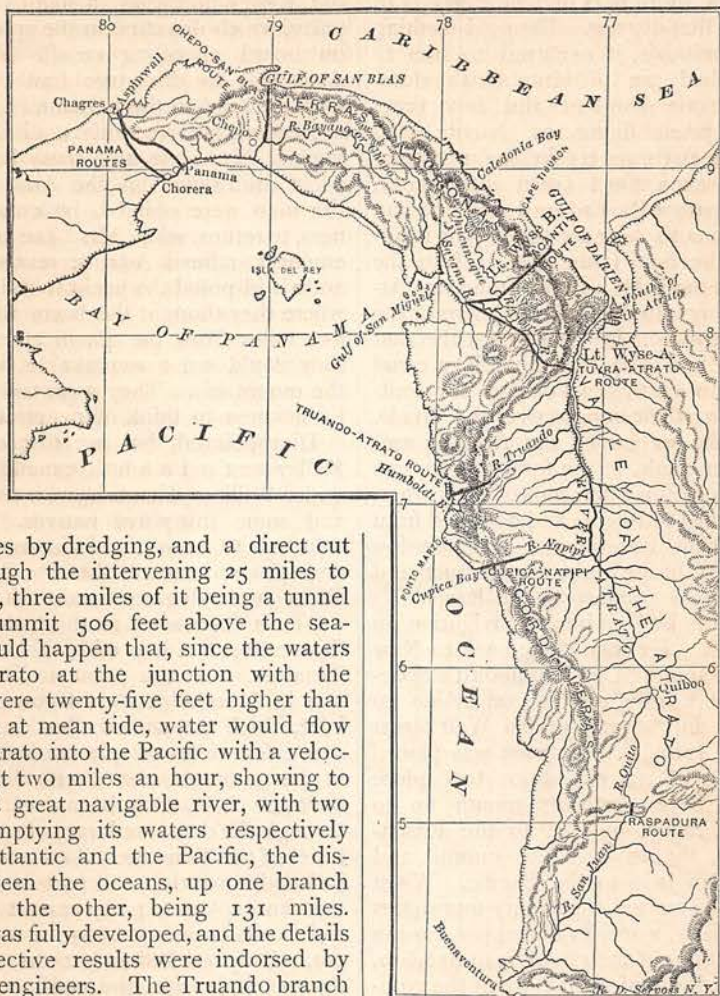
Mr. Kelley's colleagues presented him with the concession, as being of the value of waste paper, and withdrew; while he, then only twenty-eight years of age, determined to make an Isthmus Canal the work of his life. He privately fitted out a second expedition under Noah B. Porter and James C. Lane (competent engineers), which set

forth in 1853, and returned with scarcely more encouragement than the first. Mr. Lane, however, had discovered the mouth of the Truando River, and to explore it he was given the command of a third expedition fitted out with great care and expense. Mr. Kelley purchased a small yacht for the party, which departed in the spring of 1854, on board a sailing vessel. Putting into Aspinwall to discharge lumber, the crew were exposed to the Panama fever, of which the engineers were victims. Reaching Cartagena, Mr. Lane and party launched the yacht and sailed up the Atrato. Two of the men were obliged, by continued sickness, to return, while Mr. Lane and a plucky engineer, named Adams, reached the Truando and poled the yacht to its head-waters, where they thought they were about twenty-five miles from the Pacific, and believed they could see a remarkable depression in the mountains. They were too far reduced by sickness to think of penetrating further.

Disappointed, but not discouraged, Mr. Kelley sent out a fourth expedition in 1855 under William Kennish, with five engineers and some thirty-five natives. They were directed to cross the Isthmus to Panama and proceed down the Pacific coast to about seven degrees north latitude, looking out for a depression in the Cordilleras, and thence to run a line of levels across to the Truando. At the point indicated, which was in Humboldt Bay, Kennish found an inlet, which was named after Mr. Kelley, and saw a few miles away a marked depression in the mountain chain. Picking their way over the hills, they began cutting a path through the dense undergrowth to the tributaries of the Truando. So dense is the tropical undergrowth on all parts of the isthmus that an exploring party cannot penetrate a rod in many places before a way has been cut. Only one Indian hut was seen between the mountains and the confluence with the Atrato. Wild beasts, birds, and monkeys were frequently seen and heard screeching and howling, especially when the storms swept over the tropical forests. After passing the falls of the Truando the river widened and deepened until it became a succession of broad lagoons. Arriving at the Atrato, Mr. Kennish had satisfactory data for a unique plan of a canal without locks. At the point of junction the Atrato was found to be 100 yards wide and 53 feet deep, flowing slowly to the Atlantic, 63 miles away, and capable of floating the largest fleet. The mean level of the Atrato

at this point was found (by General Michler) to be only about 25 feet above the mean tide in the Pacific at Kelley's Inlet, where the tide rises twelve feet. Thereby it appeared that if the Truando were deepened

ment to verify his plans by a governmental survey such as would command the confidence of capitalists. President Pierce listened to the young canal advocate and was pleased with the project.



MAP OF THE ISTHMUS OF DARIEN AND THE VALLEY OF THE ATRATO, SHOWING PROPOSED CANAL ROUTES.

for 43 miles by dredging, and a direct cut made through the intervening 25 miles to the Pacific, three miles of it being a tunnel under a summit 506 feet above the sea-level, it would happen that, since the waters of the Atrato at the junction with the Truando were twenty-five feet higher than the Pacific at mean tide, water would flow from the Atrato into the Pacific with a velocity of about two miles an hour, showing to the world a great navigable river, with two mouths, emptying its waters respectively into the Atlantic and the Pacific, the distance between the oceans, up one branch and down the other, being 131 miles. This plan was fully developed, and the details and prospective results were indorsed by competent engineers. The Truando branch was to be on a grand scale: 200 feet wide and 30 feet deep, with two tunnels side by side piercing the Cordilleras, each to be 100 feet wide and 120 feet high,—in fact, large enough “to allow of the passage of a line-of-battle ship, with her top-mast and top-gallant-mast struck and her yards braced;” the whole work to cost, in round numbers, one hundred and fifty millions.

With everything mapped out, computed and planned, Mr. Kelley, in the spring of 1855, sallied forth to see what the world thought of his Atrato-Truando ship-canal without locks. He first asked the govern-

ment to verify his plans by a governmental survey, but there was no unappropriated money for it. The subject was discussed in cabinet meetings, at one of which Mr. Marcy, Secretary of State, said to Mr. Kelley's face that the scheme was a humbug. As for uniting with England and France for a joint survey, to give an international character and indorsement to the project, every member of the cabinet, except Mr. Davis, refused to listen to such a proposition, be-

cause they believed it to be opposed to the spirit of the Monroe doctrine.

Hopeless of accomplishing anything at home, Mr. Kelley sailed for England in November, 1855, carrying non-committal letters of introduction from Mr. Marcy to the American ministers in London, Paris and Berlin, and friendly letters from influential men to Humboldt, Sir Edward Belcher, George Peabody and others. In London, he was well received. James Buchanan, then minister to England, entered heartily into his plans, in many ways rendering him assistance, and insisted that his own government must participate with England and France in the survey, and actually tried to get the cabinet to reverse its decision. Mr. Buchanan impressed Mr. Kelley as being one of the most intelligent and accomplished gentlemen he ever met. He next made the acquaintance of Captain Fitz Roy, Sir Charles Fox and Dr. Black—men who had made a study of the canal question. They presented him to Lords Palmerston and

to unite with France and the United States in a survey.

Thus far he had succeeded in obtaining a hearing where he had most desired it; but his friends in London, including George Peabody and Dr. Black, regretted that, with such a gigantic scheme on his hands, he did not look older, for his appearance belied even his thirty-three years. They also advised him not to take his plans before the Royal Geographical Society and Institution of Civil Engineers, lest, receiving unfavorable criticism, he should thereby lose the promised aid of the British Cabinet. But the young enthusiast determined to risk both and in the meantime (this was January, 1856) ran over to Berlin and presented letters to Baron Humboldt, who was then enjoying universal homage. The baron not being at home when first he called, Mr. Kelley left his letters and the next day received a note, a fac-simile of the last paragraph of which is here reproduced to show in what diminutive characters Baron Humboldt wrote

*Je serai charmé de recevoir
mon honneur, M. Kelley de New York et
de Londres, des lettres de Sir Charles Fox
de Washington, descendant de notre grand
Benjamin Franklin. Capitaine Benham, un
de nos directeurs de la Coast Survey, m'a
présenté votre projet.*

*N. v. Humboldt
Berlin
Lund: 21 Jan
1856*

FAC-SIMILE OF PART OF AN AUTOGRAPH LETTER FROM HUMBOLDT.*

Clarendon, who granted a long interview, carefully examined the plans and promised

French. Punctual to the appointment, he was shown into a plainly furnished room filled with books, maps, globes and scientific instruments. In a moment the old gentleman came through a side door, walking with a firm step, though then eighty-eight. His young guest was made to feel at home at once. Humboldt addressed him in fluent English and asked him first, what had induced so young a man to engage in an enterprise so vast; to which Mr. Kelley replied: "Your writings, Baron." For twenty minutes Humboldt poured forth a stream of varied and compact information about the Isthmus and the science of engineering. He climbed a step-ladder with little sign of senility to get a book, and spreading out maps referred to them while he examined Mr. Kelley's. He regretted that surveys had not been made also of the Napipi, from the Atrato to its head-waters and on to Cupica Bay. When Mr. Kelley called again, by invitation, three days before his departure, Humboldt placed in his hands a long autograph letter of three foolscap pages, being a learned and hearty indorsement of his visitor's efforts in exploration, and with no mock modesty detailing his

* In translation this reads:

"I shall be delighted to receive Mr. Kelley of New York at my house to-morrow, Tuesday, January 22nd, at 11 o'clock, and thank him for the friendly letters he has brought me from Sir Charles Fox, of London, and my excellent friend Mr. Bache, of Washington, descendant of our great Benjamin Franklin. Captain Benham, one of the directors of the United States Coast Survey, informed me of your important project.

Your most humble and obedient servant

A. V. HUMBOLDT.

Monday, 21st January, 1856.

own contributions to the project. He says: "I think nothing more dangerous to the extension of commerce and to the freedom of international relations than to inspire an aversion to all future investigation by an absolute and imperious declaration that all hope of an oceanic canal must now be abandoned. I have too much faith in the powerful means afforded by the present state of civilization to be discouraged."

Returning to London, Mr. Kelley read a paper before the Institution of Civil Engineers on the practicability of a ship-canal without locks by the valley of the Atrato, confident that intelligent men and engineers would fully appreciate his aims and efforts; and so it proved. However, the first evening was one of uncertainties for Mr. Kelley. During the discussion, his plans were freely criticised, and some grave doubts were mingled with praise. Dr. Black and Captain Fitz Roy, an able authority, spoke in his favor, the latter saying: "This, certainly is one of those bold conceptions, which, if they fail, are termed chimerical; but, if they succeed (and it does appear that in this case there is a strong probability of success), immortalize the authors." A second evening was appointed to continue the long discussion, and at this Robert Stephenson, the eminent engineer, presided. The result was still uncertain. Mr. Kelley had procured a translation of the Humboldt letter, and in the midst of the proceedings sent it up to the secretary, who read it. After this, and when Robert Stephenson in closing the debate urged joint governmental survey, and said that "Mr. Kelley had produced more intelligible information upon the subject than had ever before been given to the world,"—he was no longer a shy petitioner at British doors. Soon afterward the Institution awarded him the Telford Gold Medal "for demonstrating the feasibility of uniting the two oceans by a canal without locks." The following week he read a different paper before the Royal Geographical Society, Rear-Admiral Beechey presiding. De Lesseps was present, his Suez scheme being at that time before the Society, and his maps hanging on the walls of another room. Robert Stephenson, Sir Edward Belcher, Dr. Black, Sir Roderick Murchison, Captain Fitz Roy and a large assemblage of members were present. His paper was discussed on two evenings, and Robert Stephenson again spoke favorably of the scheme. De Lesseps was asked to speak of his own plans, and began by saying that he trusted the Darien project

would prove practicable and be carried out. Not very long ago at the congress of Commercial Geography held in Paris, de Lesseps said that some persons would oppose the Darien project as a rival of the Suez Canal, but that he himself was opposed to monopolies and believed that anything which tended to increase commercial circulation would benefit the Suez Canal.

One day came an invitation from Robert Stephenson, asking Mr. Kelley to dinner at five o'clock, but hoping he might come at two for a preliminary chat.

"What do you think of de Lesseps' plan?" asked the engineer.

His guest hesitated, saying:

"I am not an engineer—neither by practice nor profession."

"But," said the host, "I think you are quite as capable of judging of this as I am."

"Then, I think de Lesseps' plans are perfectly feasible, much more so than my own," replied Mr. Kelley.

The engineer called for reasons.

"Because," said Mr. Kelley, "the Suez route traverses a perfectly dry, healthy climate; it is also flat, and an abundance of cheap labor can be had; besides, the engineering features are simple compared with those of my scheme, to be carried out in the hottest, wettest and unhealthiest climate in the world, where labor must be transported to the ground. Then it involves cutting a ship tunnel through the Cordilleras."

Mr. Stephenson thought the Suez Canal would require constant dredging.

"Yes," said his guest; "but it will prove such a vast benefit that it will pay to keep on dredging it forever."

To which Mr. Stephenson replied:

"I have had a line of levels run across Suez at my own private expense, and I am persuaded that the scheme is impracticable, on account of the drifting sands."

It was the mistake of a great man. He said he thought the Atrato-Truando project far more promising, and spoke in the highest terms of America and its enterprise. That de Lesseps did not meet with a very favorable reception in London, Mr. Kelley thought was due to British jealousy.

In July, 1856, Mr. Kelley went to Paris, against the advice of Mr. Buchanan, who, on setting off for home (probably on the lookout for the Presidency), promised to get the co-operation of the United States govern-

ment, with which, and with that of the British government already secured, he might hope to win over Napoleon to the project. But Mr. Kelley, knowing that the Secretary of State, Mr. Marcy, thought the ship-canal about as practicable as a route to the moon, did not long defer shipping his hobby across the channel. For six long months he worked incessantly to get an audience with the French emperor. John Y. Mason, the American minister, was very courteous, but rendered no assistance; for what reason Kelley never could divine. The French minister of foreign affairs, to whom he received an introduction, said "Very good," to the plans, and gave a shrug, a bow and a smile, and referred him to the American minister for a presentation. Likewise, the British and German ministers. Thus matters went on till January 26, 1857. On that day he was surprised to meet an English barrister and his wife—London friends—at *table d'hôte*. They inquired after his success in Paris, and he related his disappointments, the landlord and landlady, who for the first time learned the object of their guest's restless sojourn, listening with curious interest. After dinner, the barrister asked to see his maps, which were spread out on the table, nearly the entire company remaining to hear his story. Madame Mercier, the landlady, caught the canal fever at once. "You shall see the emperor," she cried. "My uncle is a friend of the emperor's. He will arrange the audience." Early the next morning, she drove off to see her uncle, La Fouche Pelletier, son of the first Napoleon's great friend, and on returning said to Mr. Kelley: "Remain at the hotel to-day, for I think the emperor will send for you." Her guest smiled incredulously; but between one and two o'clock came a message inviting him to an audience at the Tuileries at 5 p. m.

At the palace, Mr. Kelley was cordially received by the emperor, who assured him of his lively interest in all ship-canal projects. He had noticed, he said, that the Americans had thrown aside his own plan for a Nicaragua Canal. (While languishing in the prison at Ham, Napoleon had written a pamphlet on the Isthmus project.) When Mr. Kelley's plans were spread out, he said, "Mr. Kelley, you will please let me ask questions, as I find it easier to comprehend a subject by making inquiries." This was a gentle hint to the American citizen that the Emperor of the French felt himself capable of leading the conversation. And indeed his information was very full and

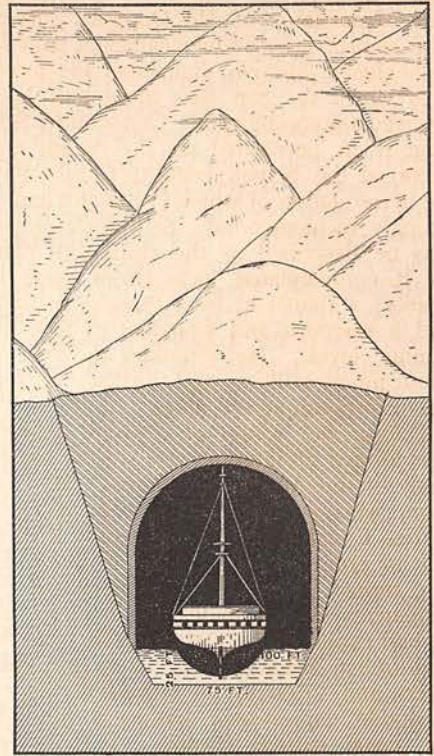
ready. He listened attentively to what was said, assisted in tracing out the lines on the maps, and was greatly pleased with the tangible shape in which the enterprise was presented. Twice he walked away, and appeared as if he would leave the room, returning each time to continue talking with animation. Finally he said: "Mr. Kelley, I like your plans. What can I do for you?" He offered to make the survey at the sole expense of the French government, to which Mr. Kelley could not assent, since he had invited the English to co-operate. Then he said he would pay a third, if the British and United States governments would agree to open the canal to the commerce of the world and make the territory neutral; moreover, if the survey was favorable, he thought he could guarantee one-third of the capital necessary to carry out the plans. Then, requesting further information after Mr. Kelley's return to America, Napoleon directed a servant to fold the maps, and withdrew.

Mr. Buchanan had now become President, and Mr. Kelley hastened home to take advantage of the old signs of friendship. The President, seeing him in a long line of visitors at the White House, called him out of the line, saying so that all might hear: "Here, at least, is one man who doesn't want office." The next day, at a private interview, Mr. Kelley asked Mr. Buchanan to join with the British and the French to make the survey, and was amazed to hear the President say: "I will do all in my power for you, but this can't be done." He reminded Mr. Buchanan of different opinions expressed in London. "Yes," the politician said smiling, "but it can't be done, and you mustn't ask me why." And so the man of department vacillated before the Magog of party expediency and the ghost of James Monroe. However, the government offered to make the survey independently of foreign powers, and Brigadier-general Michler of the army and Lieutenant Craven of the navy headed an expedition to the Atrato, which returned in May, 1858. A dispute arose as to which officer ranked the other, and thereby had the privilege of supervising the report. It took a year to settle this hotly contested point of red-tape etiquette, which resulted in a compromise. General (then Lieutenant) Michler made an exhaustive and able report in favor of the Atrato route, correcting and improving on Mr. Kennish's plans. Lieutenant Craven, in a brief report, declared adversely. Then it took another

year at Washington to get the report printed, by which time the rebellion had broken out, Mr. Kelley's concession had expired by limitation, and his brilliant and promising hobby had broken down completely. Impoverished in hopes and fortune, he retired from active advocacy of the scheme.

Mr. Kelley's enthusiasm revived, however, in 1863, when his attention was called to the San Blas route, between the Gulf of San Blas and the Bayano, or Chepo River, at the narrow neck of the Isthmus, it being there only thirty miles from ocean to ocean. His own means being exhausted, he succeeded in interesting Cyrus Butler, and the late Luke T. Merrill in his plans. Mr. Butler, who has become a zealous advocate of the scheme, now owns a considerable share in the French company possessing the Darien concession. In the autumn of 1863, Captain Norman Rude, with the assistance of the natives, ran a barometrical line over the San Blas route. The following spring a surveying party was equipped, led by A. MacDougal. Beginning on the Pacific side they found a good harbor in the Bay of Chepillo; and discovered that the Bayano River would afford perfect ship navigation for more than ten miles with almost no improvement; and that for eight miles further the ground was admirably suited to canal purposes, crossing only one considerable stream, the Mamoni River. They were now at the foot of the Cordilleras, the summit of which was found to be 1,500 feet. Crossing over to the foot of the hills, on the Atlantic side, MacDougal estimated that the contemplated tunnel would be seven miles long; this was on the supposition that he was within three miles of San Blas Bay, affording a magnificent harbor, which, with its numerous islands, lay in full view before him, the land sloping gradually to the sea, with the Mandinga River some distance to the left. He attempted to triangulate the distance to the Gulf of San Blas, but hostile Indians compelled the party to beat a retreat. His report was highly satisfactory and plans were made for a canal. Since the tide at the starting-point of the canal, ten miles up the Bayano, rose nearly 13 feet, and on the other side in San Blas only $2\frac{1}{2}$ feet, the plans were made to comprise tidal locks at the extremities of the canal to prevent the waters of the Pacific at high tide from flowing through into the Atlantic with a current troublesome to the passage of ships, and also to prevent a counter-current during the

ebbing of the tide. The accompanying cut indicates the sectional area of the proposed



CROSS SECTION OF THE MOUTH OF THE PROPOSED SAN BLAS TUNNEL. HEIGHT OF TUNNEL, 115 FEET.

tunnel, 100 feet wide and 90 feet high above the water-line, 25 feet above the bottom of the canal, making the entire distance from the bottom to the crown of the arch, 115 feet. It was the aim of Mr. Kelley and Mr. Butler to re-secure a concession from the government at Bogota. During the administration of President Grant, both he and Secretary of State Hamilton Fish took great interest in the canal project, but the government thought the concession ought to be procured in the name of the United States. This, it is believed, excited the suspicions of the Colombian authorities, who demanded conditions rendering the concession practically worthless. In 1870, Commander Thomas O. Selfridge was placed at the head of an important governmental expedition to explore the Isthmus. Among other routes, he set out to verify from the Atlantic side the San Blas survey of MacDougal. He reached the summit, and the rainy season having set in, concluded to return. He gave it as his opinion, however, without

going entirely over the mountains, that the tunnel would be ten instead of seven miles long, while in other respects he admitted the general accuracy of MacDougal's survey. This assertion, based on insufficient data for a conclusive opinion, dampened the fervor with which the San Blas route had been received among engineers. Commander Selfridge then proceeded up the Atrato and surveyed the Napipi route to Cupica Bay, the investigation of which Humboldt had so strongly recommended. Selfridge's project may be described as the composite plan, for it contemplated locks (from three to twenty), a tunnel at least three miles long, and a reservoir and aqueduct to feed the summit level. He estimates the cost at about ninety millions, and the distance from ocean to ocean at 178 miles.

During the winter of 1875-76, de Lesseps formed an international society for the study of the American Isthmus. M. Gorgoza, who possessed a concession for a Darien Canal, which he had vainly tried to sell to prominent politicians in Washington, turned up in Paris, and repeated the statements he had made here, namely, that he had explored the Darien neck, from the Gulf of San Miguel *via* the Tuyra and Paya rivers, and so on to the Atrato, finding remarkable depressions, making a through-cut canal entirely feasible. This helped to set the ball of exploration rolling in Paris, and proved to be on a par with the nonsense that has always adhered to the history of the San Miguel region. About 1850 Dr. Cullen declared that he had crossed from the Savana River, emptying into the Gulf of San Miguel, to Caledonia Bay on the Atlantic, finding an opening in the hills, which would admit of a through-cut canal, with moderate cost of construction. He drew a fascinating bird's-eye view of the way his canal would look when completed, but of this value, that where he declares an open cut could be made through a depression in the hills, it would in reality be necessary to bore a tunnel some twelve miles long.

In 1876, the society of which General Türr is president, organized in Paris for the exploration of the San Miguel or Tuyra region, the stock of this speculative company being divided into 100 shares. De Lesseps would neither buy nor accept stock, preferring not to be identified with the private financial interests of the scheme, knowing that with respect to the general project the public would expect him to occupy an impartial or judicial position, and one devoid of

the suspicion of self-interest.* Among the gentlemen owning an interest in the company are M. Pereire, supposed to be worth over a hundred millions, and the owner of the French line of transatlantic steamships; P. M. Oppenheim, the wealthy Frankfurt banker; Cyrus Butler, of New York; G. Vedelius, a Swedish engineer, and two famous literary men, Émile Littré and Octave Feuillet, the dramatist. The most important member, to the company, has been Lieutenant Lucien N. B. Wyse, of the French navy, son of the late Sir Thomas Wyse and (as the Bonapartes style her) the "Princess" Letitia Bonaparte, daughter of Lucien, brother of Napoleon the First. Though only thirty-five years of age, Lieutenant Wyse has made many scientific explorations, besides serving both on sea and land in the Franco-German war. He has crossed the American continent from sea to sea, in twelve different places, between Patagonia and San Francisco. In March, 1878, he performed the journey of seven hundred miles from Buenaventura to Bogota, on horseback, in ten days. This tremendous ride was made over a common trail, with a fresh horse every two days, Lieutenant Wyse sustaining himself by eating balls of chocolate, and arriving in Bogota just in time to secure a canal concession from a friendly outgoing administration.

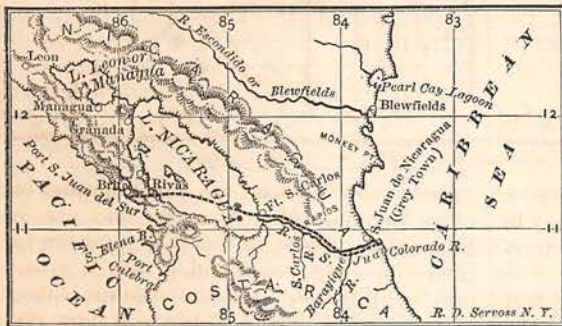
Between 1876 and 1879, Lieutenant Wyse made surveys of two canal routes by way of the Gulf of San Miguel and the Tuyra River to the Atlantic. One of these (marked A in the map on page 272) follows the valley of the Tuyra River and one of its branches, thence over the divide to the River Caguirri, which empties into the Atrato; this route requires twenty-five locks. The other (marked B), preferred by its projector, begins at the same point on the Tuyra, about twenty miles from the Gulf of San Miguel, proceeds east to the junction of the Tupisa with the Chucunaque, and then makes almost a straight line to the point of Acanti on the Atlantic side, where a harbor must be created. As projected by Lieutenant Wyse, the tunnel would have a length of about eight miles, a height of 118 feet, a width of 52½ feet at the bottom of the canal, and of 65 feet at the water line,—thus having a capacity smaller than the San Blas tunnel with a proposed width of 100 feet. In determining the width

*It is said that de Lesseps made no money out of the Suez Canal, and has had to meet the expenses of his position and family out of his salary of \$10,000 a year.

of the tunnel, weight must be given to the opinions of ship-owners. Of all things they fear to have a ship touch her sides against wall or pier, and as there is almost sure to be a current of between two and three miles an hour in the canal, a ship of only forty feet beam could be handled in this narrow channel only by great watchfulness and difficulty.

If the wisdom of the congress decides that a canal with locks is more practicable and desirable than a canal with a tunnel, the choice will undoubtedly lie between Lieutenant Wyse's Tuyra-Atrato and the Nicaragua routes, with a majority, at the

own lock project and his tunnel scheme respectively, at about the same sum,—in round numbers, one hundred millions. Passage through a canal being necessarily slow, there must be great difference in time and attendant expense between, on the one hand, drawing a ship by tug-boat through the Nicaragua Canal, 181 miles from ocean to ocean,—or even through the Tuyra-Atrato Canal, about 110 miles from sea to sea,—and, on the other hand, through the San Blas Canal, only 30 miles long, or through the Tuyra-Acanti line, with 42 miles of canal and tunnel and 20 miles of navigable river. A ship of 5,000 tons burden could be pulled through the San Blas Canal probably in six hours, making "turn-outs" unnecessary, ships passing from the Atlantic to the Pacific one-half of the day, and going in the opposite direction the other seven or eight hours; while it is safe to say that, under the most favorable conditions, three or four days would be consumed in making the passage of the Nicaragua Canal. The question of locks between five hundred and six hundred feet



MAP OF THE PROPOSED NICARAGUA ROUTE.

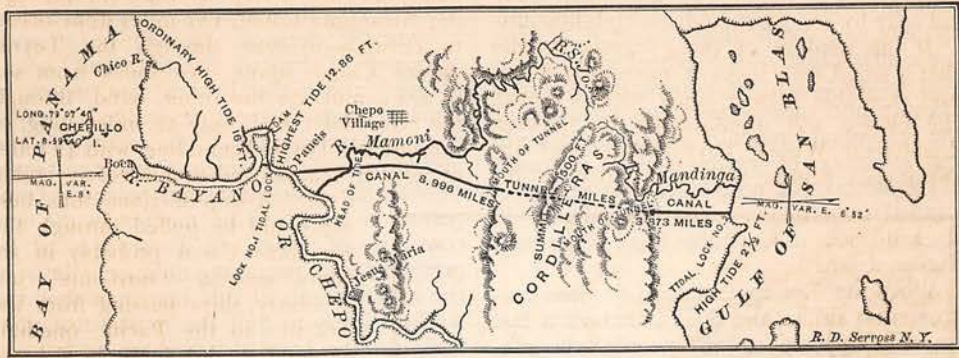
outlet, favoring the latter. But it is inconceivable that practical engineers, considering future usefulness no less than temporary facility of construction, would adopt a lock route, unless they believed it practically impossible, even at double the expense, to construct a tunnel canal on the mean tide level. Nicaragua Lake, a large navigable sheet of water extending to within sixteen miles of the Pacific, and having the San Juan River for its spacious outlet, has frequently drawn the attention of ship-canal projectors. Lieutenant Lull and Chief-Engineer Menocal, both of the United States navy, in the reports of their surveys make the distance from Brito to Greytown 181¼ miles, and place the cost of construction at about fifty-three millions, including the unfortunate necessity of making harbors (for no natural ones exist) at both termini. It is proposed to lock down from the lake to the Pacific and to improve navigation on the San Juan by means of locks and dams. M. Blanchet is at the head of an association owning a concession for this route, and will urge its claims before the congress. He thinks fourteen locks would be sufficient, and places the cost between forty and fifty millions of dollars. Lieutenant Wyse estimates the expense of his

long—for there must be room both for the ship and the tug-boat—is in many respects more serious to solve than that of a ship-tunnel. Grave doubts are entertained by the ablest engineers of their ability to construct locks of that size capable of withstanding the water pressure, even supposing that lock-gates of the requisite dimensions could be made to open and shut with the necessary facility. What prudent ship-owner would care to put his ship of 5,000 tons burden, loaded with a valuable cargo, into a canal 181 miles long, involving the passage of twenty-four locks, if these locks were liable to get out of order, thereby delaying transit a week or a month? It must not be forgotten that a ship-canal will not be built to gratify engineering ambition or hydraulic theorists, but to satisfy the practical wants of ship-owners. De Lesseps is inclined to favor a tunnel, and declares the necessary conditions for a practicable canal to be: no locks, good harbors, and the avoidance of other than tidal rivers. Lieutenant Wyse is substantially of the same opinion, and Mr. Kelley and his engineers, convinced that no other kind of canal ever would be constructed, have steadily adhered to the tunnel plan.

As between the San Blas route advocated

by Mr. Kelley, Mr. Butler and others, and the Tuyra-Acanti route surveyed by Lieutenant Wyse, the public, applying the judgment of practical common sense, will probably say, "Other things being equal, choose the shortest way across." It is thirty miles

lodgment of logs and drift-wood, in a way to bank up the waters, would place little dependence on any possible grillage at the mouth of the roaring Chucunaque. On the San Blas route the Bayano River forms ten miles of the canal, almost ready made.



MAP OF THE PROPOSED CHEPO-SAN BLAS CANAL AND TUNNEL ROUTE.

over the San Blas Isthmus, and sixty-two miles between San Miguel and Acanti. Besides, it is very clear that "other things" are not equal, but are decidedly in favor of the San Blas route. Take the conditions named by de Lesseps. There is no better harbor on the Atlantic side of the Isthmus than that of San Blas, while at the other extremity of the line the Bay of Chepillo, a fair harbor, opens into the Bay of Panama. On the other hand, it is necessary to make a harbor at Acanti, though San Miguel is in every respect but one an excellent harbor. Here the extreme tide rises at the mouth of the Tuyra to the height of twenty-five feet, coming in with such force that ships are said sometimes to drag their anchors, while ordinary high tide at the mouth of the Bayano or Chepo (of the San Blas route) reaches only a height of about sixteen feet. Then as to the avoidance of other than tidal rivers: at the junction of the Chucunaque and the Tupisa rivers, Lieutenant Wyse proposes to turn both these rivers into his canal. The Chucunaque has always been noted for its floods. It has a very large water-shed, given to sudden and terrific rain-falls, the torrents coming down with a roaring sound which the natives recognize with dread. Further up the stream the water has been found to rise thirty and forty feet during the rainy season. Lieutenant Wyse proposes to protect the canal from the flood drift-wood by a strong grillage. Any one who has once witnessed what destruction to dams and piers on the upper Mississippi is frequently caused by the

And at the "Paneis" the canal empties into the Bayano, which flows by, and not into the canal. Between this point and the tunnel the only considerable stream crossed is the Mamoni. On the Atlantic side of the tunnel, the canal passes over three miles of smooth country, unbroken by streams, the Mandinga River lying a little to the north. Lieutenant Wyse estimates that his tunnel line would cost one hundred millions. If the San Blas tunnel is seven miles long, the line is estimated to cost \$87,550,000; if ten miles long, as Commander Selfridge supposes, it would cost \$108,500,000. Lieutenant Wyse, who made hasty examination of the line, thinks the tunnel could be reduced to nine and a half miles, and Mr. Kelley and Mr. Butler firmly believe that MacDougal is right in his estimate of seven miles. The United States government will be asked to make an official survey. Lieutenant Wyse thought so well of the San Blas route that he crossed the ocean during the winter to examine the Kelley-Butler plans, as well as to invite American representation at the congress. That extraordinary difficulties will be encountered in the construction of any proposed Isthmus canal, is most certain. In many respects, it would seem better if a ten-mile tunnel were required on the San Blas route; then a third of the canal would be the Bayano River, and a third a tunnel cut in imperishable rock, and protected from the floods, and in which the laborers could work during the rainy season. Rear-Admiral Ammen, who in an able pamphlet severely criticises the Tuyra-

Acanti route, lays much stress on the almost insurmountable difficulty of excavating the bottom of the tunnel twenty-five feet below the level of high tide, and on the cost of carrying away and depositing the excavated material. When the time comes for breaking ground, there will be means devised, probably, for overcoming these difficulties, as there will also be drills invented, making the construction of the tunnel, except that part below tide water, comparatively much cheaper and more expeditious than that of the St. Gothard tunnel. As to the disturbing influence of earthquakes, Lieutenant Wyse affirms that no danger is to be apprehended from them; even the galleries in the salt-mines of Colombia have never been shaken down.

When de Lesseps failed to procure governmental aid for the Suez Canal, as a last resort he appealed to the people, who subscribed more money than he wanted. If this canal congress, with the prestige and

authority derived from the eminent engineers who are expected to take part in the deliberations, settles on a route, an international company, similar to that which constructed the Suez Canal, will be formed with a capital of \$100,000,000; and de Lesseps ventures to say that the money will be subscribed within ninety days after the congress reaches a favorable decision. It will be a stock company of limited liability, and incorporated under the French law, which in some respects is most favorable to great financial transactions. According to the plan proposed, the present French company owning the concession and receiving compensation for it will be merged in the new company, of which de Lesseps is to be president and managing director. It is in the achievements of this one man that the world is likely to find the most substantial basis for the hope that we are at last approaching the successful solution of the great engineering problem of the century.

INVOCATION.

SCENT of the rose! . . .
 Breath of the new-plowed field and verdurous sigh
 From copses budding! . . .
 Myrrhs that the chafing boughs
 Of aromatic pine-trees cause to fly
 O'er coily fern-tops, studding
 The layers damp of fronds that heap in long wind-rifted rows . . .

Bloom of the quince
 So firm and ruddy and tender to foretell
 Crisp fruit and solid! . . .
 Heart of the forest prince
 Of odor nuttier than the sandal smell! . . .
 And all ye marshes squalid
 Whose fog a savory saltness pricks, whose veins the clear tides rinse . . .

Hair of the night,
 Black where the stars glimmer in sparks of gold
 Through tresses fragrant . . .
 Breeze that in smooth, cool flight
 Trails a strange heat across the listening wold . . .
 Breast of the coy and vagrant
 Uncertain spring, beneath whose cold glows the great heart of light . . .

Clouds of the blue,
 Crowned by the sun and torn by lightning-jag . . .
 And joyous sparkles
 In seas and drops of dew . . .
 Ye smiles and frowns that alter where the crag
 Glitters and darkles! . . .
 Hear me, ye blissful, that alone see why I call on you!