Original Articles.

ULCERATIVE ANGINA. AN OCCASIONAL EARLY SYMPTOM IN TYPHOID FEVER.

By NATHANIEL ROWDITCH POTTER, M.D., NEW YORK,

Assistant Professor of Clinical Medicine, Columbia University (College of Physicians and Surgeons); Visiting Physician to the New York City Hospital, and to the French Hospital.

In April, 1910, at the meeting of the medical section of the New York Academy of Medicine, I reported in three cases of typhoid fever an ulcerative angina as an unusual and sometimes confusing symptom. The scanty mention of this condition in American medical literature is the reason for the following report and review.

Seven years ago my attention was first brought to this so-called "ulcerative typhoid angina" by my incorrect diagnosis of syphilis in a woman of 27, who, although still at work when I saw her, had for some days been suffering from malaise, headache, sore throat, and general febrile symptoms. In addition to a moderate elevation of temperature, a considerable acceleration of pulse, and a thick yellowish vaginal discharge, she presented a coated tongue and a superficial oval, yellowish grey ulceration, the size of a small bean, at the upper third of the left anterior pillar of the fauces. This ulcer was surrounded by a narrow zone of reddened mucous membrane, and the lymphatic glands at the angle of the left jaw were a little enlarged and tender. A culture upon blood serum showed a staphylococcus aureus. In the course of a few days an aggravation of the constitutional symptoms, the development of a palpable spleen, the exhibition of a few rose spots, and the change from a negative to a positive Widal reaction, revealed the correct diagnosis. Within ten days from my first observation the ulcer gradually contracted and healed without visible scar. The course of her disease was severe and complicated by several hemorrhages and a consecutive relapse.

Four years ago a woman of 40 was transferred for examination and diagnosis to my wards at the New York City Hospital, after several days' observation and treatment upon the syphilitic service there. Before admission to the hospital several physicians had diagnosed her malady as ulceration of the throat secondary to syphilis. She, too, ran a severe course of typhoid fever, complicated with hemorrhage and later with intestinal perforation, followed by laparotomy and eventual recovery.

The third case occurred at the French Hospital upon the service of one of my colleagues, Dr. Mc-

Connell. A tentative diagnosis of diphtheria was at first made, but the negative throat culture and later a positive Widal and blood culture, in addition to the subsequent course of the disease, proved it to be typhoid fever.

A fourth case, a young man of 27 years, was admitted to my service at the French Hospital, Oct. 28, 1911, with a temperature of 103°, pulse of 96, and respiration of 28, complaining of malaise, sore throat, headache, and general febrile symptoms. It was impossible to determine accurately the onset of his disease. He had been confined to bed with a cold and dry cough for a few days nearly three weeks before, returned to bed with diarrhea and vomiting five days before, and had a nose bleed three days before entrance. His trunk and extremities were covered with a maculo-papular eruption, resembling somewhat a secondary syphilis. He complained of sore throat, exhibited slight salivation, and marked pyorrhea. His tongue was moist, coated with a yellowish covering and presented three ulcerations. In size they varied from 0.5 to 1.5 cm. in their longest diameter. The smallest was situated beneath the tip of the tongue. The second, the largest and deepest, on the left edge an inch from the tip, opposite a jagged tooth, exhibited irregularly excavated edges, and was filled with a dirty gray slough, upon removal of which a base of muscle fibres was disclosed with very little bleeding. The third was smaller, half way between this and the tip. Three other similar ulcerations were noted upon the faucial pillars, respectively; on the left anterior pillar near the soft palate, on the left posterior pillar at about its middle, and on the upper third of the right anterior pillar. These were discrete, superficial, oval or elliptical, of approximately the same size as the largest ulcer upon the tongue, greyish yellow in color, and were surrounded by a light hyperemic zone. Upon very carefully wiping away the greyish exudate they exhibited a somewhat reddened base, but did not bleed. Smears and cultures from these ulcers revealed only staphylococci and a few short plump non-motile rods (Bradbury.) No spirillae nor spirochetes were to be found. The Widal reaction, negative at entrance, became positive three days before his death (November 4th, one week after entrance). The lymphatic glands draining these ulcers were at first neither tender nor appreciably enlarged; but became greatly swollen within four days coinciding with an increase in the leucocyte count (5,200 to 11,400) and in the percentage of the polynuclear leucocytes (68 to 84). Permission for a post-mortem examination was refused, so that unfortunately a histological examination of the ulcers was not made.

A fifth case: Male, Austrian, age 23, waiter, entered my service at the French Hospital, Oct. 21, 1913, admission No. 24,514. For nine days before entrance, he complained of malaise, insomnia, constipation, anorexia, chilly feelings, and headache, two days later feverish, weak and dizzy; next day vomited after a purge, and this was followed by a diarrhea which persisted till entrance. Gave up work four days before and took to bed three days before entrance, with a temperature of 104.5°. Headache had persisted and increased in severity. No

nose bleed. Upon entrance patient presented the typical appearance of typhoid at the height of the disease with a dicrotic pulse, tympanites, a spleen enlarged to percussion but not palpable, and a very profuse maculo-papular eruption covering the trunk and extending to the arms and forearms but not involving the thighs or legs. Many of the spots were hemorrhagic. The tongue was coated and moist, with very prominent papillae at its tip; there was marked gingivitis and salivation. The pharynx was uniformly congested and largely covered with tenacious mucus. There were two tiny ulcers the size of the head of a white pin at the edge and upper extremity of the right anterior faucial pillar and a single one of slightly larger size and an irregular outline at the corresponding position on the left anterior pillar. These ulcers were covered with a thin grayish exudate which could be wiped away only with some difficulty on account of the patient's gagging. There were no palpable glands nor was there any tenderness. Hemoglobin 100%, leucocytes 4500 with 48% polymorphonuclears, 46% lymphocytes, 5% large mononuclears and 1% eosinophiles, Widal positive, blood culture positive, Diazo marked. The fever intermitted between 101° and 105.5°; the pulse usually about 100 varied between 90 and 112, the respirations usually below 30 varied between 24 and 32; and the urine, at first normal, showed a few days before death, a moderate febrile reaction. The treatment included bathing or sponging, hexamethylenamine, and two doses of typhoid vaccine administered on the 21st (60 million); and the 24th (100 million) October 23d. Smears and cultures were made from ulcers of pharynx by Dr. Bradbury. No typhoid bacilli but a staphylococcus aureus and a streptococcus were found. Oct. 24th, the ulcers on right side had nearly healed; that on the left pillar was larger, deeper, still more irregular in contour, covered with a white exudate and surrounded by a much reddened mucosa. A small irregular ulcer was found upon the left edge of the tongue and two tiny ones on the uvula. Oct., 25th, ulcerations of left pillar smaller and cleaner, less redness of surrounding mucosa. Tongue dry, congested, and bleeding. Three tiny ulcerations on right edge of tongue. Oct. 26, all remaining ulcers healing, tongue very dry, glazed and bleeding. Oct. 27th, ulcers scarcely visible except upper one on uvula. Severe hemorrhage from post nares. No bleeding point found. Oct. 28th, 7 p. m., severe epistaxis uncontrolled by packing. Oct. 29th, profuse crop of hemorrhagic spot from one-eighth to one half inch in diameter on back and on calves of legs; large irregularly-shaped ecchymoses of some depth in skin over interscapular, and sacral regions and on calves and anterior surface of legs. Hemorrhage from nose nearly controlled by packing. Hgb. 68%. Leucocytes 8000, polymorphonuclears 51%, eosinophiles 1%. Oct. 30th, patient very weak and restless, urine involuntary, pallor striking, nose still bleeding despite packing. Systolic blood pressure 130, consolidation of right upper lobe. Patient died that night. Unfortunately no autopsy was permitted.

A sixth case: (For the privilege of observing and reporting this case, I am indebted to the courtesy of Dr. Lipset.) Male, Italian, age 26, cook, entered French Hospital, November 1, 1913, admission No. 24,569. For eight to ten days before entrance,

complained of continuous severe frontal headache; seven days before entrance, epistaxis and fever; next day went to bed and remained there. Ran a typical but short course of rather severe typhoid with delirium or stupor; continuous fever at about 104°; rather rapid respirations (32 to 44) corresponding to a severe bronchitis; considerable rather tenacious sputum; dicrotic pulse (90 to 120, usually about 100); an enlarged spleen; a moderate crop of rose spots; tympanites; involuntary urine; and a positive Widal reaction and blood culture.

On the eleventh day* of the disease his pharynx was red, swollen, and the uvula markedly edematous. Two small ulcers were noted on the left anterior pillar and a third, slightly larger at the top of the right anterior pillar of the fauces; each covered with a thick yellowish white exudate and surrounded by an edematous and congested mucous membrane. The uvula was covered in spots with a similar exudate. There was no glandular enlargement nor apparent tenderness, but the patient's stuporous condition made it impossible to determine whether or not the throat was sore or swallowing painful. By the thirteenth day, the exudate upon the upper half of each pillar and uvula had coalesced and entirely obscured the ulcerations. The exudate disappeared by the fifteenth day and the ulcer upon the right side, about the size of a pea, was seen to be granulating and somewhat elevated above the rest of the mucous membrane while those of the left were much smaller, one almost healed and the other healing. By the eighteenth day the latter had healed, the congestion had faded and the edema had disappeared, and by the nineteenth day the right one had also healed. At no time were any glands made out to be enlarged. On the 14th day smears and a culture from these ulcers were made by Dr. Bradbury. Great care was exercised to avoid producing bleeding, and no typhoid bacilli were found; but a staphylococcus aureus and two streptococci.

Synonyms: Typhoid angina, pharyngeal typhoid, Bouveret's ulcers, Duguet's ulcerations.

Louis¹, Chomel², Murchison³, and Jenner⁴ were cognizant of the occasional occurrence of an inflammation and ulceration of the pharynx in typhoid, but they certainly did not distinguish these ulcers from other types of pharyngeal involvement in enteric fever. Nonat⁵ was the first (1843), so far as I can determine, to publish a clear and distinctive description of this lesion: "Les ulcerations dont il s'agit affectent ordinairement l'un des piliers du voile du palais; elles sont ovalaires; leur étendue varie; il en est qui ont la grandeur d'une pièce de vingt-cinq centimes; d'autres sont un peu plus petites; leur bords sont taillés à pic; leur font est grisâtre; la membrane muqueuse qui les entoure est injectée, rouge sur une surface plus ou moins grande. . . Elle existait déjà vers la fin du première septenaire ou au commencement du second."

I find no further mention of the lesion until 1876 when Bouveret⁶, for whom the ulcers are

* Although his febrile course was brief, the day the patient took to his bed was reckoned as the first day of disease.

frequently named, published the account of a carefully observed case. He failed to mention Nonat's previous communication. In 1883 the condition was ably presented to the "Société médicale des hôpitaux de Paris" by Duguet⁷ and thoroughly discussed there by a number of eminent clinicians, several of whom cited illustrative cases. Among them Landouzy⁷ dilated upon the features essential to differentiate this from similar throat lesions in tuberculosis and in syphilis. He also cited several cases from his own experience, one of which apparently exhibited an active and early tuberculous lesion at both apices.* Shortly before and after this communication several contributions from the French school (⁸ to ¹⁰ and ¹¹ to ¹⁴) appeared, some of them attempting to compare the pharyngeal with the intestinal ulcers upon the basis of a similar involvement of lymphoid tissue and an analogous histological architecture, but this contention could be supported neither theoretically nor anatomically.

The Germans were not interested in Bouveret's ulcer until some years later (¹⁵ to ¹⁹). In 1887 Landgraf²⁰ published a comprehensive and critical analysis of this lesion. He refused to acknowledge its specificity, mentioned a case occurring 48 days after the onset of the fever, denied any involvement of lymphoid tissue, and condemned the lack of bacterial investigation. We are indebted to the Strassburg Clinic (¹⁶, ²¹, ²², ²³) for the most prolonged, persistent and carefully planned clinical observations as well as for the first account of the occurrence of the identical lesion in another disease, tuberculosis.²³

England and America have paid but scanty attention to its existence. Osler²⁴ merely states that the pharynx may be the seat of catarrh or ulceration. McCrae who contributed the article on typhoid in Osler's System of Medicine²⁵, does not mention it. J. Lorrain Smith in Albutt's System²⁶ alludes to it briefly and quotes Rénon's opinion that the ulceration is caused not by typhoid bacilli, but by staphylococci and streptococci. The English translations of two notable German works²⁷, ²⁸ discuss it; one of them (Nothnagel) in some detail. Curschmann, the author of the latter, describes the lesion fully, comments upon its practical disappearance from medical literature for many years, and quotes four cases where the throat symptoms gave rise to erroneous diagnoses of croup, diphtheria, scarlet fever, and syphilis.

Frequency. Devic and Schaefer estimated their frequency at 20% (1 in 5 or 6 cases), Hofmann quoted by Landgraf²⁰ at 11% (28 in 255), Novotny²⁹ from Chvostek's clinic at Vienna at 6% (6 in 102), Ludin³⁰ from Gerhardt's clinic at Basle at 12% (8 in 68), and Samuel²² from Krehl's clinic at Strassburg at 7% (76 in 1102). Blum²³ regards the last mentioned percentage a minimum. The percentage varied markedly in

the different years as well as in the different epidemics. At Strassburg there were no ulcers noted in 80 cases from 1888 to 1890. From 1890 on, the number noted began to increase except in 1900, when there were 56 cases, and none of them exhibited ulcers. In 1901, 2 in 38 cases; 1902 to 1905, 8 to 12%; in 1906, 17 in 127 cases; in 1907, 7 in 63 cases. Blum contrasts 10 in 512 (2%) cases from 1888 to 1900 with 66 in 590 cases (9%) from 1901 to 1907. At Basle 4 of 30 cases in 1907 exhibited ulcers, 2 of 13 in 1908, 1 of 15 in 1909, 1 of 10 up to April, 1910.

Numbers. Although most cases previously reported presented but a single ulcer, at Strassburg two or more occurred in 15 of the 76 recorded, and in 5 of my 6 cases, whereas the greatest number exhibited in any one case was eight. Letulle³¹ pictures the throat of a patient with seven ulcers.

Healing. Trouillier³² states that the ulcers heal from within five to thirty days; most writers specify from two to three weeks. They healed within ten days in the four of my six cases who survived. All agree that they leave no scar.

Glandular Involvement. Only two of my six cases were accompanied with enlarged and tender glands. Wagner¹⁸ describes a slight swelling, and Derignac¹⁴ recorded several with tender glands. Rapin¹², Von Willer³³ and Trouillier³², on the contrary, found neither enlargement of the lymph glands draining the ulcers nor any appreciable tenderness there.

Subjective Symptoms. In most instances the throat lesion was discovered, not because of any complaint upon the part of the patient, but as a result of a detailed routine examination. Sore throat or dysphagia occurred in three of my six cases, in two of Nonat's⁵ seven, in one of Duguet's⁷ three, in two of Lécorché and Talamon's¹⁰ three, and in one of Von Willer's³³ seven, whereas at Strassburg pain occurred in but four of seventy-six cases, and in only one of them was it severe, in which instance the pain persisted as long as the ulcers lasted. Hoarseness, cough and dyspnea have also been noted.

Histology. As these ulcers are seldom late lesions, autopsy records are available in but few instances. The French writers at first claimed that the lymphoid tissue of the pharyngeal ring was involved, but they presented no anatomical evidence in proof, and Landgraf plainly showed that the same type of ulcer is also found where there are no lymphoid follicles (lip and epiglottis); and he believes that they belong to the ordinary superficial nutritional disturbances of the mucous membrane under the head of catarrh and that redness and erosion are only milder stages of the same process. The only case of Duguet's⁷ three which came to autopsy showed merely a disappearance of the more superficial epithelial cells without

* See Ludin's and Blume's communications.

any involvement of lymphoid elements. Letulle³¹ shows a section through a deep ulcer, the floor of which is formed by the muscular and fibrous tissue of the faucial pillar; there is a pronounced accumulation of lymphoid elements below the floor and at the edges of the ulcer. Two of the Strassburg²³ cases were examined histologically by Schmidt of Zurich. They showed neither the large cell infiltration of the intestinal lesion nor anything characteristic or suggestive of typhoid fever, so that Blum concludes that the ulcers are merely catarrhal. This opinion is supported by the description of one of Duguet's cases in which an ulcer gradually developed upon a very much reddened mucous membrane; of one of Roque's 34 cases in which the ulcer was preceded by an herpetic-like vesicle and of one of Derignac's³⁴, in which a very small greyish ulcer developed the day after the appearance of a slight elevation of epithelium like an indistinct herpetic vesicle. Further support of their catarrhal nature is furnished by their healing without leaving a scar.

Bacteriology. As one might expect, and very likely depending upon the care employed to avoid producing bleeding, the results of the smears and the cultures that have been made in the published cases are at great variance. Renon³⁵, Bonnette³⁶, Letulle³¹, and Schaefer³⁷ found only staphylococci or streptococci. Neither Vamossy's³⁸ case nor Wagner's¹⁸ three cases showed any typhoid bacilli. Bendix and Bickel³⁹ report one positive finding in ten cases of various types of angina in typhoid. Besson⁴⁰ found typhoid bacilli six times in ten cases, but he punctured the tonsils each time. Novotny²⁰ claims to have isolated in pure culture, a paratyphoid bacillus B. from a pharyngeal ulcer on about the twelfth day of the disease in a patient whose blood, urine and stools showed typical typhoid bacilli. Blum found typhoid bacilli in three of five cases; but in sections of the buccal mucous membrane and of the ulcerations from two of Blum's cases, Schmidt²³ was unable to find any typhoid bacilli. Staphylococci were found alone in my first case; and despite painstaking and repeated attempts in my fourth case, Bradbury only discovered staphylococci and a short, thick, non-motile bacillus. In neither my fifth nor my sixth cases were any typhoid bacilli found, but in both staphylococci and streptococci. While making the smears and cultures in each of these three cases, Bradbury was especially careful to avoid producing any bleeding. This evidence seems to show that these ulcers are caused by or are secondarily infected by germs other than typhoid bacilli. Even a larger number of positive findings would hardly convince one of their dependence upon the typhoid bacillus itself since smears and cultures from such an ulceration might very readily be inoculated by organisms directly from the blood.

Cause, Relation to Other Infections and Specificity. From a study of the reported examples of this lesion, the very few histological and relatively few bacteriological examinations, we are led to the conclusion that these ulcers are superficial nutritional catarrhal processes produced by dryness of the mouth and occluded nose (Landgraf²⁰), possibly involving largely parts exposed to pressure and poorest in lymphatics (Fraenkel¹⁹, Trouillier³²), and in all probability caused by some secondary infection, staphylococcus or streptococcus (Blum²³), in turn dependent upon improper cleansing of the mouth (Friedlander¹⁵). The same type of ulceration has been noted in paratyphoid (Blum²³ three in nine cases, Novotny²⁰ once), so that it cannot be used to differentiate a typhoid from a paratyphoid fever, as was claimed by Letulle.³¹ An apparently identical ulcer has also been described in four cases of tuberculosis (Blum³², Ludin³⁰, possibly one of Landouzy's cases), so that despite the claims of most of the above-mentioned writers, Bouveret's ulcers are not absolutely specific, although most suggestive of enteric fever.

Relation to the Severity of the Disease, Prognosis, and Relapses. Letulle's³¹ experience, based upon more than sixty cases, leads him to believe that it occurs most frequently in mild forms of the disease. Von Willer³³ and Landgraf²⁰, on the contrary, found it more frequently in severe cases of typhoid. Trouillier³² quotes 54 in grave, 44 in moderate, and 17 in mild forms of the disease, while Blum cites 30 in grave, 29 in moderate, and 17 in mild forms. Two of my six died and two others were very severe forms of the disease. Their existence from the above evidence, therefore, makes a severe course of typhoid probable and suggests a guarded prognosis.

If the ulcers fail to heal, a relapse seems more probable (Fohanno⁴¹, Devis, Trouillier³²). The last named quotes eleven relapses in eighty-one cases, in five of which the persistence of the ulcers made the possibility of a relapse a probability.

Diagnostic Value, Time of Appearance, Differential Diagnosis. As is now well recognized, a simple sore throat of a catarrhal nature^{18, 12, 42}, a tonsillitis^{26, 18}, or a phlegmonous pharyngolaryngitis^{43, 18}, may usher in the early symptoms of enteric fever, but in America and in England the diagnostic value of the ulceration so frequently named for Bouveret has hardly been appreciated. In three of my six cases an erroneous diagnosis of syphilis and in one of diphtheria was made by more than one competent observer; nearly all the writers upon this condition mention such difficulty, and Curschmann²⁷ in particular cites diphtheria, scarlet

fever, croup and syphilis as being wrongly applied to four cases of typhoid with angina. Blum²³ and Ludin³⁰ have, to be sure, described the same type of ulceration accompanying tuberculosis, but the paucity of such observations detract but little from the positive diagnostic value of these ulcers of the pharynx in a febrile patient.

Most of the published cases, it is true, did not exhibit the ulcers early enough to be of striking value in the differential diagnosis of a fever in which modern laboratory methods have so nearly supplanted clinical observation. The ulcers anticipated the appearance of the rose spots, however, in the cases reported by Bonnette³⁰ (fourth or fifth day), by Du Costel (8 days before spots), in two of Duguet's⁷ three cases, in two of the three cases reported by Lécorché and Talamon, in one of Cahn's¹⁷ five cases, and in one of Wagner's¹⁸ three cases. In two of my cases they preceded both the spots and a positive Widal. In most of the cases, however, the ulcers coincided with the appearance of the roseola during the second week; and although Nonat⁵ claimed that they never began after the second week, Fohanno⁴¹ cites one on the 17th, Bendix and Bickel³⁹ one on the 18th, and Landgraf²⁰ one on the 48th day of the disease.

Derignac¹⁴ and Laségue laid some stress upon the differential diagnosis between typhoid angina and pharyngeal tuberculosis; Kussmaul at first regarded Schott's case as one of tuberculosis, but at this time the connection between these ulcers and typhoid fever was not generally known in Germany. Although they occurred in tuberculous individuals, neither Blum nor Ludin considered the ulcers in their four cases to be due to a tuberculous process, because three of them healed promptly without a scar, and because in Blum's second case the microscopical examination showed that the lesion was a simple catarrhal ulcer exactly like the histological picture of the corresponding ulceration in typhoid, and with no suspicion of any tuberculous change, caseation or tubercle formation. With modern laboratory methods a tuberculous ulcer can be promptly and accurately diagnosed as such so that we need only bear in mind the same type of simple catarrhal ulcer has been noted to accompany tuberculosis as well as typhoid. As far as scarlet fever is concerned, the enlargement of the spleen, the presence of rose spots, the absence of a leucocytosis, the relatively slow pulse, the gradual onset, and especially the serum test and the early blood culture will prevent any mistake. The same may be said of diphtheria with the addition of a prompt examination of a throat smear and culture. A differentiation of the mucous patches of secondary syphilis may be more difficult, especially if, as in my fourth case, a suspicious rash covers the body (in this case I attributed the rash to some drug administered before the patient's entrance). The absence of a primary lesion, scar or enlarged

lymph nodes, the history, the onset, the eruption, the slow pulse rate, the Widal or Wassermann reaction, and an early blood culture should clear the difficulty. Besides which the location, numbers, and especially the appearance are more or less distinctive. Derignac¹⁴ contrasts the greyish white or greyish granite of the typhoid with the whiteish opalescent porcelain-like appearance of the syphilitic ulceration. He also mentions the possibility of confusion with mercury, antimony, carbolic or salicylic poisoning, as well as a chancre, herpes, thrush, aphthae or variola. Their distinction should be readily made.

SUMMARY.

1. In enteric fever there appears not infrequently (6 to 12%), it may be before, but as a rule about the same time as the roseola, one or more small superficial ulcers, usually situated upon the anterior pillars of the fauces, the so-called typhoid angina or Bouveret's ulcer.
2. These ulcers may appear sufficiently early to be of some value in the clinical diagnosis of typhoid.
3. An appreciation of this lesion will prevent the mistaken diagnosis of syphilis, diphtheria, croup, and scarlet fever, as well as of other local lesions.
4. The ulcers are probably due to a secondary infection upon a mucous membrane altered by the existing disease.
5. Although an exactly similar lesion has been described in four cases of tuberculosis and so detracts from its credited specificity in typhoid fever, such are evidently very infrequent exceptions, lessening but little its diagnostic value.

REFERENCES.

- ¹ Louis: "Recherches sur la fièvre typhoïde," Paris, 1841, vol. i, p. 493.
- ² Chomel: "Leçons de Clinique Médicale," Paris, 1843 (Fièvre Typhoïde), p. 232.
- ³ Murchison on Continued Fevers, Ed. 3, 1884, Cayley; Longmans, Green & Co., p. 614.
- ⁴ Jenner, quoted above (3), p. 614.
- ⁵ Nonat: "Révue Médicale," 1843, vol. ii, p. 301.
- ⁶ Bouveret: "Ann. d. mal. d. oreil. et d. lar.," Paris, 1876, No. 2, p. 355.
- ⁷ Duguet: "Bull. et mém., Soc. Méd. d. hôp. de Paris," 1883, vol. xx, p. 101.
- ⁸ Bouchard: Thèse de Paris, 1878, "Étude sur un épidémie de la fièvre typhoïde."
- ⁹ Bonnelond: Thèse de Paris, 1878, "Considérations sur l'Angine de la fièvre typhoïde."
- ¹⁰ Lécorché et Talamon, 1881, Paris. "Études Médicales, p. 569."
- ¹¹ Comby: "Progrès méd., 1883, vol. xi, pp. 365, 409."
- ¹² Rapin, E.: "Rev. méd. de la Suisse romande, 1883, vol. iii, No. 12, p. 645."
- ¹³ Siredey: Thèse de Paris, 1883, "Recherches sur l'anatomie pathologique de la fièvre typhoïde. Lésion des organes lymphoïdes."
- ¹⁴ Derignac: Thèse de Paris 1883.
- ¹⁵ Friedländer, C.: "Fortschr. d. Med., 1884, vol. ii, p. 349."
- ¹⁶ Schott: Inaug. Diss., Strassburg, 1884, "Ueber eine bisher wenig beschriebene Form von Gaumengeschwülsten die bei Typhus abdominalis vorkommen."
- ¹⁷ Cahn, A.: "Berl. klin. Wchnschr., 1886, No. 14, p. 217.
- ¹⁸ Wagner, E.: "Deutsch. Arch. f. klin. Med., 1886, vol. xxxvii, p. 201."
- ¹⁹ Fraenkel, E.: "Deutsch. med. Woch., 1887, No. 6, p. 101."
- ²⁰ Landgraf. "Charité-Ann., 1887-88, vol. xiv, p. 271."

- ²¹ Blum, L.: "München. med. Wehnschr., 1906, vol. liti, Pt. 2, p. 2292."
- ²² Samuel, F.: Inaug.-Diss., Strassburg, 1908, "Ueber Angina Ulcerosa bei dem Abdominaltyphus."
- ²³ Blum, L.: "Semaine méd. 1908, vol. xxviii, No. 4, p. 37."
- ²⁴ Osler, W.: "Practice of Medicine, ed. 6, 1905, p. 79."
- ²⁵ Osler's Modern Medicine, 1907, vol. ii, Infectious Diseases.
- ²⁶ Albutt: "System of Medicine, ed. 2, The Macmillan Co., 1905, vol. i, pp. 1101, 1106, 1117, 1118."
- ²⁷ Nothnagel's Encyclopedia of Practical Medicine, American Edition, 1905, Typhoid Fever and Typhus Fever; Curschmann: pp. 201 and 202.
- ²⁸ Leube: Special Medical Diagnosis (English Translation), 1904, Appleton, p. 916.
- ²⁹ Novotny: "Wien. klin. Wehnschr., 1909, vol. xxii, p. 779."
- ³⁰ Ludin, M.: "Cor.-Bl. f. Schweiz. Aerzte, 1910, vol. xl, No. 24, p. 752."
- ³¹ Letulle, M.: "Presse méd., 1907, No. 83, p. 669."
- ³² Trouillier: "Press. Oto-laryngologique Belge, 1908, vol. vii, p. 147."
- ³³ Von Willer: Cor.-Bl. f. Schweiz. Aerzte, 1889, vol. xix, p. 545.
- ³⁴ Roque: Province médicale, 1891, vol. v, No. 1, pp. 3, 15.
- ³⁵ Rénon, L.: Gaz. d. hôp., 1892, No. 88, p. 830.
- ³⁶ Bonnette, P.: Archiv. de méd. et de pharm. militaires, 1907, vol. i, p. 121.
- ³⁷ Schaefer: Thèse de Paris, 1899, "L'Ulceration des piliers du voile du palais dans le fièvre typhoïde"
- ³⁸ Vámosy, St. v.: Wien. klin. Wehnschr., 1888, Nos. 18, p. 888; 19, p. 405; 20, p. 421.
- ³⁹ Bendix and Bickel: Deutsch. med. Wehnschr., vol. xxviii, No. 23, p. 409.
- ⁴⁰ Bosson, A.: Rev. de Méd., 1897, vol. xvii, p. 405.
- ⁴¹ Fohanno: Thèse de Lyon, 1895.
- ⁴² A Study of the Oral and Laryngeal Complication of Typhoid Fever especially as observed in hospital practice: J. S. Gibb, Penn. Med. Jour., 1908-9, vol. xii, p. 817.
- ⁴³ Blumer: Yale Med. Jour., 1909-10, vol. xvi, p. 452.

MEMORIAL TO MISS CLARA BARTON.

It is announced that three memorial buildings are to be erected at Red Cross Station, Glen Echo, Md., as a monument to Miss Clara Barton, founder of the American Red Cross, who died there in April, 1911.

"There is to be a main memorial building with a frontage of 100 feet and a depth of 160 feet, which is to be an auditorium for lectures, meetings of women's clubs and a treasure house for the curios, decorations and certificates of honor conferred upon Miss Barton.

"The main auditorium building is to cost \$100,000. The First Aid Building and the Nurses' Home are to cost \$75,000 and \$50,000 respectively.

"The main building is to be T-shaped, the front 100 feet across and 60 feet deep. Then it is to run back another 100 feet, making the total depth 160 feet. A striking feature of this auditorium is to be a recess in which a large painting of the only picture ever made of Clara Barton while in actual battlefield or hospital work is to be placed. It is being painted from a small photograph made by a relative at Havana in 1898. The rooms on the second floor in the rear are to contain the Barton curios, trophies and decorations, most of which are now in safe deposit vault in Boston. These include ninety-four certificates of honor from crowned heads and states and cities which had been aided by Miss Barton in times of great disaster.

"The First Aid Building is to be equipped with all latest appliances for surgical work and in charge of surgeons who will have in constant training teachers to be sent throughout the states. The building is to be endowed. The Nurses' Home is to contain rest rooms, library, reception hall, parlor, dining-room, kitchen and bedroom accommodations for twenty-five nurses."

SOME OF THE PROBLEMS OF PRIVATE SANATORIA FOR TUBERCULOSIS AS OBSERVED DURING TEN YEARS' EXPERIENCE IN THE POTTENGER SANATORIUM FOR DISEASES OF THE LUNGS AND THROAT.

BY FRANCIS M. POTTENGER, A.M., M.D., LL.D.,
MONROVIA,

Medical Director of the Pottenger Sanatorium for Diseases of the Lungs and Throat, Monrovia, Calif.

THE Pottenger Sanatorium for Diseases of the Lungs and Throat has just completed its tenth year. It was the writer's pleasure to conceive, build, equip, and finance, and organize this institution. He has been intimately connected with every detail of its running from the start. As medical director he has literally lived with the patients of the institution during nearly all of this period, having his home on the grounds and being intimately connected with the life of the place.

During this time there have been 1521 patients treated in the institution. The stay of these patients has varied from one day to three and one-quarter years. The majority of patients remained in the institution and were under close observation during a period of seven or eight months. This has afforded an exceptional opportunity to study both the laboratory and clinical side of tuberculosis; to acquaint oneself with every phase of its development and progress both toward dissolution and toward arrestment; to study all the various complications, tuberculous and non-tuberculous; to learn to know the patient from both a physical and psychological standpoint, and, in fact, to study every peculiarity of the disease and the patient.

Coincident with this sanatorium experience the writer has treated patients in his city office, a majority of whom were charity cases and many of whom were compelled to work during the time that they were taking treatment. This has afforded a splendid opportunity of studying the disease as it presents itself in different social conditions and of comparing methods of treating the disease under home and institutional environment. He has been led to the conclusion that the advantages which the sanatorium offer those who are able to avail themselves of it are many. The patient is isolated. He is removed from home and business with their interests and