the handling of specimens of this disease, checking up gross observations with microscopic examinations made from numerous places, one is able at the time of operation, in an occasional case, to determine whether or not the growth may be confidently considered to be benign. He, therefore, believed that radical operation should be the rule, but that occasionally it was possible to safely perform some such conservative operation as the plastic procedure described by Warren.

STATED MEETING, HELD APRIL 4, 1910

The President, Dr. Robert G. LeConte, in the Chair.

THE SURGICAL ASPECT OF EPULIS AND SARCOMA OF THE JAW.

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There are many conditions of the jaw the pathology of which differs to such an extent that surgical measures must depend necessarily upon the characteristics of the tumors or diseases in question. The relationship which exists between the class of growths termed in a broad sense "epulis" and other more malignant tumors is an important one. In this paper, attention will be directed only to the connective-tissue tumors of the jaw, and those derived from epithelial structures or the conditions due to faulty development of the teeth will not be considered.

The term epulis signifies a tumor springing from the gums, and although the word has been condemned justly because of the confusion its use has entailed, it has become nevertheless so thoroughly a part of the nomenclature of jaw tumors that it cannot be excluded. Probably the greatest difficulty has been experienced in keeping clear the relationship of the highly malignant sarcomata which, springing from the deep tissues of the jaw, pursue a more unfavorable course than the relatively benign sarcomatous epulides. It becomes necessary, therefore, to properly understand such distinctions in order to describe the varieties of epulides and the sarcomata.

Epulis was used originally to describe any tumor which had its origin in the tissues of the alveolar process of the jaws,

the term being used independently of the pathologic type of tumor. Thus carcinoma, sarcoma, and various benign tumors such as myxoma, chondroma, fibroma, etc., were included. The tendency in more recent times has been to describe as an epulis only the sarcomatous and fibromatous tumors originating on the alveolar margin, and to designate the other tumors in this region by their true pathologic name. Because of their less malignant tendency, the sarcomatous forms of epulis are thus properly excluded from other more dangerous forms of sarcoma, but the term "epulis sarcoma" or "epulis fibroma" should be employed rather than simply to use the vague term "epulis." It is particularly desirable to separate from the epulides the carcinomatous type which is occasionally encountered, because it presents altogether a different clinical course from the sarcomatous epulis.

The histologic examination of collected cases of epulis shows a varied picture. Kühner, in his series of 31 cases, found 20 giant-cell sarcomata, 2 spindle-cell sarcomata, 4 fibrosarcomata, 2 fibromata, 1 osteoma, and 1 granuloma. The proportion of giant-cell sarcoma, about two--thirds of all the cases, corresponds to the observations of most writers. Hesse in a recent contribution, however, has disputed these facts, for he found that of 113 cases of epulis, 30 were sarcomatous, and by far the most common form encountered was fibrous in nature. This difference is explained by the fact that the majority of these cases were seen in a dental clinic, where the small and painless tumors are most commonly encountered, whereas the more rapidly growing and consequently more malignant forms are usually referred to the surgical clinics.

Histologically, giant-cells are found in enormous numbers in the majority of cases, the chief constituent of the tumor being composed of spindle- or round-cells. The tumors contain considerable blood pigment and extravasated blood, and at times are quite vascular, thus explaining their brownish-red color. Spicules of bone are common constituents of the growth, a fact which indicates that the bone-forming layer

of the periosteum is involved in the growth of the tumor. An epulis occasionally arises from the submucous connective tissues, or in the peripheral layers of the alveolar process, and by growing externally appears beneath the mucosa.

The sarcomatous epulis is a pedunculated tumor, dark red in color, more or less movable, and may cause distortion in the outline of the teeth as it enlarges. The mucosa covering the tumor is intact in the early stages, but sooner or later shows points of erosion due to local traumatism, from which slight hemorrhage may occur. The tumors are usually soft in consistency, but may be firm and hard when of the fibrous or the fibrosarcomatous type.

The statistical studies of Kühner, Gunzert, and others, show a marked predisposition of the female sex, in whom two-thirds of the cases occur. While the disease may be seen at any time of life, it is most commonly encountered in the second, third, and fourth decades, although it is not uncommon in younger and older individuals.

Among the factors chiefly concerned in the etiology of epulis, caries of the teeth may be mentioned as the most prominent. The irritation of ragged, irregular, diseased teeth plays an important rôle in the formation of these growths, and such a history will be obtained from the majority of patients. In the instances in which extraction of a diseased tooth has been followed by the formation of a tumor, it is likely that the traumatism was sufficient to cause active growth of cells left behind after the removal of the tooth. This is especially likely when we bear in mind the tendency of the tissues of the mouth, the mucosa and the periosteum of the alveolar process to react to any sort of irritation. It should be mentioned, however, that epulides occur in the presence of sound teeth and under proper oral hygiene, neglect of which seems to act as a predisposition to the formation of the tumors. The influence of pregnancy in the development of an epulis has been repeatedly mentioned; the association, while difficult to explain, seems to be more than a mere coincidence. Finally the effect of artificial teeth, the irritation of pipe smoking, and other

forms of long-continued traumatism may be mentioned as possibly having some etiological importance.

Clinically the tumors rarely cause serious symptoms. The jaw may be infiltrated in the late stages of the disease and absorption of the cortex arise; it may extend to the antrum or nasal cavities, displace the tongue, or cause protrusion of the lips. In the very large tumors, difficulty in chewing, swallowing, and speaking may be caused. Pain, which at times is complained of, is due to the diseased condition of the teeth. Repeated traumatism may cause hemorrhage from the more vascular growths, which in time may cause a moderate degree of anæmia. The ulcerative condition of the gingival mucosa may play a rôle in causing more rapid enlargement of the epulis.

The benignancy of this class of neoplasm is well demonstrated by the fact that metastasis to the regional lymph-nodes occurs practically in advanced cases only. The enlarged nodes seen in the course of an epulis are usually of inflammatory origin, and are caused by infection absorbed from carious teeth. In many instances the nodes disappear after extirpation of the tumor, and in those cases in which the enlarged lymphatics were removed with the tumor, microscopic examination has failed to reveal malignancy in the nodes.

The tumor generally exists for a considerable period before operative intervention is carried out; in most instances a year or more may elapse until rapid enlargement of the epulis causes the patient to seek surgical aid. Perthes is inclined to place little weight in the view that the giant-cell tumors are less rapid in their growth, because he has observed cases of the same histologic character, in which marked difference in rapidity of the enlargement has been present.

It is a well-known fact, that whereas epulis is a tumor benign in nature from the clinical stand-point, it tends to recur when insufficiently removed, and in such cases the recurrent tumor may take on a more rapid growth. Kühner records 11 recurrences in 90 cases of epulis—the operation in this series removed only the visible tumor tissue and not the portion of

the alveolar process from which it sprang. If secondary operations are carried out promptly, the chance of ultimate cure is good, for instances are on record in which repeated operations have finally resulted in a cure.

That the prognosis is good is shown in the very large percentage of cures which ranges from 75 to 97 per cent. An important observation was carried out by Kühner in four of the cases not undergoing operation for the radical removal of the epulis. He found that three died from the effect of the tumor, one of general sarcomatosis; the second, a man fifty-four years of age, of extensive recurrence; and the third, a male aged sixty-six, from blood poisoning originating in the epulis. In the fourth case, a boy aged five, spontaneous healing occurred and persisted for a period of 25 years. From these cases and similar observations, it is apparent that epulis, if neglected, may become highly malignant, and resemble in this particular the sarcomatous growths of the jaw.

Fibroma.—This affection appears as a central growth, or it may arise from the periosteum and appear as an epulis of the fibrous type. The growth has many of the characteristics of the sarcomatous epulis, but appears harder and more compact, owing to the large amount of fibrous tissue in its structure, which accounts for its lighter color. In some instances the cells of the tumor are so abundant that the growth is quite soft, resembling a sarcomatous epulis for which it is mistaken at times. Eve holds the opinion that most of the so-called fibrous epulides are sarcomata, for in his series of cases a pure fibrous epulis did not exist. This, however, does not correspond with other observations; I have studied two cases in which there was no evidence of sarcomatous tissue in growths which were classified as fibrous epulides. Gunzert described myxomatous degeneration of the tissues which is particularly prone to arise in the tumors of long standing. The base of the epulis may contain lime salts or spicules of bone. While the tumors are usually small, they at times reach a large size and are dangerous from a mechanical stand-point. Sudden enlargement is indicative of a malignant degeneration, *i.e.*, sar-

coma. Perthes calls attention to the tendency of the fibrous epulis to appear as multiple growths affecting both jaws.

The central variety of fibroma differs as greatly from the fibrous epulis as does sarcoma from a sarcomatous epulis. The growth, according to Perthes, may occur in either jaw, but is more common in the lower. The tumor takes its origin from the central part of the bone, and as it grows the periosteum and cortex become expanded over it, forming a thin shell, or the rapidly growing tumor may be covered with a layer of tissue containing bone trabeculæ derived from the periosteum. The tumor may be firmly attached to the bone covering it or lie free in the cavity. When seen in the upper jaw, the tumor tends to spread toward the antrum, or may arise primarily in that situation.

The growth of a fibrous epulis is essentially a slow one, it may occupy many years in its development, and most commonly occurs in the third and fourth decades of life. The enlargement does not, as a rule, produce pain unless pressure is exerted upon nerves, as, for example, infra-orbital neuralgia may occur in the fibromata of the upper jaw. There is no tendency of the tumors to metastasize, ulcerate, or infiltrate the surrounding tissues, all of which point to its benign nature. Secondary infection and necrosis have followed exploratory incision in a fatal case recorded by Heath.

The diagnosis depends largely upon the gradual growth and painless course of the fibroma. If the tumor is attached to the lower jaw, distending it, and if surrounded by a shell of bone, the differential diagnosis between it and other benign growths will be difficult, and may only be made by aid of a Röntgen examination. The differential diagnosis may also be difficult in slowly growing myxosarcomas in the same location.

The operative measures in these cases demand complete removal of the tumor and the portion of bone to which it is attached. Only in exceptional cases will it be necessary to do total resection, and then only when the size of the growth prevents less radical measures. Following partial resection

of the jaw and the tumor, the results have been satisfactory, since the benign nature of the fibroma excludes the possibility of a recurrence.

Sarcoma.—Sarcoma of the jaw occurs less frequently than carcinoma, the proportion being about two cases to the former to three of the latter. The relative frequency of sarcoma of the jaw is shown by Gurlt's statistics in which 14,630 tumors included 532 growths of the jaw, and of the latter 179 were sarcomata, 96 occurring in the upper jaw and 63 in the lower. From these statistics and other observations, the upper jaw is found to be the more common site of the tumor. As already noted in the sarcomatous epulis, the female sex is more often affected; the same relative proportion is observed in the jaw sarcoma. In Perthes's collected statistics of 126 cases, 55 were men and 71 were women.

Trauma seems to play an important rôle in the etiology of sarcoma. Whether the effect of injury is manifested by the stimulation of tumor cells already present, or whether the trauma is even more intimately concerned in the origin of the growth, is difficult to prove. The cases which I have studied show in several instances that trauma played a part in the development of the tumor. In one instance a very large sarcoma began its initial growth several months after the extraction of two teeth and reached its maximum size in eight years. It is possible in this case that the effect of trauma was manifested by increased rapidity in growth of cells, which were present at the site of the diseased teeth, but which were more or less inactive previous to the traumatism. In another instance, a boy aged twenty-two was injured while boxing, and several of the lower teeth were loosened. After this accident tenderness was present for several months, and then swelling of the jaw arose. This condition lasted for three years, when rapid enlargement took place, so that four years after his accident a definite mass the size of a hickory-nut projected from the middle of the ramus of the lower jaw. This tumor and the adjacent portion of the jaw were removed by Dr. C. H. Frazier, and on microscopic examination was found to be an osteosarcoma of a low degree of malignancy.

Histologically all varieties of sarcoma occur and follow the general rule that the smaller and more abundant the cells, the greater the degree of malignancy, as manifested by rapidity of growth, metastasis, and tendency to recurrence. The giant-cell sarcomata are the least malignant and resemble the tumors of similar structure found in other bones in respect to their slow and relatively benign course. In contrast to the simple forms of sarcoma, those in which cells of the original embryological jaw structure are reproduced present a more varied picture. Thus chondrosarcoma, fibrosarcoma, and osteosarcoma are met with, all of which possess a greater or less degree of malignancy, depending upon the number and size of the sarcomatous elements.

A curious tendency of the last named type lies in the formation of highly malignant secondary growths composed of pure sarcomatous tissue, in which the bone or cartilage may not be reproduced. In general it can be said that sarcoma of the jaw has but a slight tendency to metastasize to the regional lymphatics draining the area and tends still less to spread to the viscera. Enlargement of the cervical nodes may be present, but in many instances it is the result of infection rather than a secondary tumor formation. It is not an uncommon experience to see enlarged nodes disappear after the jaw tumor is excised, although it is a safer and more scientific surgical principle to remove enlarged nodes, as in any radical operation for the cure of a malignant tumor.

The symptoms produced by the peripheral form of sarcoma differ somewhat from the central variety. The latter tends to produce more or less hard, rounded, circumscribed tumors which generally enlarge toward the outer surface, and may be mistaken for dentigerous cysts. Later in the course of the growth, the cortical layers of the compact bone become rarefied, and the crackling sensation common to central sarcoma of bone may be produced. As the tumors enlarge, pressure symptoms develop, thus œdema of the eyelid and mucous membrane of the antrum, dislocation of the eyes or teeth, dilatation of the superficial facial veins, obstruction of the nasal

duct, and difficulty in speaking and swallowing may occur. The periosteal tumors present a somewhat different picture, in that the shape of the growth varies, it takes its origin directly from the periosteal covering of the jaw, a fact easily demonstrable on palpation. In the early stages the mucosa is intact, the growth is painless until it undergoes ulceration or the infiltration of the bone causes pain. Pain is also seen in the neoplasms which press upon nerves. Neuralgic conditions of the teeth may arise and direct attention to the cause, a beginning sarcoma.

The operative indications of jaw sarcomata depend on the histologic type of tumor and the extent of the growth. Perthes's statistics based upon the results obtained in several clinics lead us to conclude that, after a period of three years, a third of the cases of total resection of the jaw for sarcoma will remain well. One-half of the patients develop recurrence, a fact which demands still more radical measures in treating these cases. It must be stated, however, that partial resection of the jaw has met with considerable success, but too great emphasis cannot be laid upon the class of cases for which this operation is indicated. The small, well-circumscribed, giant-cell sarcomata situated on the alveolar margin of the upper jaw, irrespective of epulis, and sarcoma of the hard palate may be partially resected. Similar growths on the alveolar process of the lower jaw may be treated in the same way, but all other forms of sarcoma should be subjected to total resection. The percentage of cures in these cases will increase if we operate at an earlier period, before the growth has involved a large area of the bone. The slight tendency toward regional or general metastasis should prove of great value in favoring early operation, and markedly assist in cure because of the lessened possibility of recurrence.

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Dr. W. M. L. Coplin (by invitation) said with reference to melanotic tumors of the jaw that he had seen specimens from a number of these cases and did not know of a single one in which recurrence did not take place. Dr. Speese spoke of the prognosis based on histological examination. This may be possible if the tumor contains many giant cells, but when dealing with neoplasms composed of round or spindle cells the method becomes of doubtful value; it is probable that in these cases the outcome depends largely upon the resistance of the patient. Usually the paramandibular tissues are not involved early, a fact depending upon the architecture of the jaw, the periosteal and intra-osteal tissues acting as a filter that resists extension of the growth.

Another point worthy of attention is the relative immunity of the submaxillary and sublingual glands. Of the specimens which come to the laboratory for examination, he had seen one in which either a submaxillary or a sublingual gland was extensively invaded. He had seen the growth almost surround a salivary gland but for some reason or other it is rare to see it penetrating the lobes or even the interlobular tissues. In all neoplasms of the mouth the salivary glands are attacked late, if at all. He had never seen a telangiectatic sarcoma of the jaw in which there has been extensive ulceration, a fact for which a fully satisfactory explanation is wanting. The jaw enlargement is accomplished by internal osseous absorption and continual subperiosteal apposition. He had one specimen removed by Professor Hearn in which the involved area of the jaw was larger than a fist, and still there was no sign of extension through the outer bony layer and no involvement of the soft parts; this tumor presented egg-shell crackling in a very marked degree.

Dr. A. P. C. Ashhurst inquired whether Dr. Speese had succeeded in following any patients treated by radical operation. It has been claimed by recent writers that it is useless to do a radical operation as the disease, if highly malignant, recurs in a few months and the patient dies; whereas an operation consisting in an evacuation and scraping of the tumor is sufficient in cases which are not so malignant.

Dr. John Speese rejoined that the diagnosis in most of the cases operated upon at the University Hospital had been made from the clinical appearance of the tumors, although in some

instances frozen sections had been made when the growths had been soft and not infiltrated with lime salts or bone. In the central sarcomata, in three or four cases, the bone was trephined and sections taken for microscopic examination, the operative procedures being based upon the character of the growth, the giant cell tumors being treated by less radical measures than other types of sarcomata.

His experience agreed with that of Dr. Coplin for the salivary glands had been involved rarely in malignant disease of the mouth and jaw. Their records show that many of the periosteal and central sarcomata, both round and spindle cell in type, have been cured. The number of cases traced through the Surgical Laboratory does not permit him to state at present, however, the percentage of cures in the cases operated upon.

ENTEROPTOSIS.

Dr. George P. Müller reported a number of cases of enteroptosis, and remarked that the abdominal organs are held in position by the negative pressure of the thoracic cavity, the mutual support of the different organs, the peritoneal, ligamentous and vascular attachments, etc. If these are interfered with, ptosis will result, and such interference may occur from congenital or acquired causes.

The congenital type is usually seen in a thin, pale, young woman, of slight build, with a long sunken thorax, flabby abdominal walls, a juvenile expression and a bodily form exactly like that seen in the tuberculous. The tissues are inherently weak and fragile and the actual displacements occur from secondary causes such as exhausting diseases, marked loss of weight, overstrain, lack of proper nourishment, constricting clothing, pregnancy, uterine affections, prolonged cough from bronchial affections, etc. The earlier manifestations are seen in the attacks of dysmenorrhœa and chlorosis that young girls experience and later the symptoms may be erroneously interpreted in such vague terms as neurasthenia, nervous exhaustion, chronic constipation and change of life. There is no essential difference between the symptoms due to a movable kidney, a retroverted uterus or a displaced colon except those dependent upon the drag on different anatomical supports, the general phenomena being the same.

The symptoms are referred to the digestive apparatus, the generative organs, the nervous system, or to the body generally; gastric hyperacidity, flatulence, constipation, vague abdominal pains, backache, pelvic troubles, leucorrhœa, headache, menstrual and vesical troubles, melancholia, nervousness, etc., are the most prominent symptoms and the patient complains of a total lack of energy, physical and mental. There is a lightness of weight and a general relaxation and flabbiness of the tissues.

Physically, the oblique slant of the ribs, the acute epigastric angle and the very long abdomen and small waist are characteristic. The tenth rib may be freely movable or floating (Stiller's sign). One or both kidneys are often palpable, the liver is displaced and its edge palpable, the stomach displaced and may be dilated, the colon and sigmoid are usually displaced and often redundant, the uterus may be retroverted or flexed.

A movable cæcum may produce symptoms indistinguishable in many cases from true appendicitis and Klose believes that in many of the cases of recurrence of trouble after operation without supposed chronic appendicitis a movable cæcum is at fault.

The *acquired type* is due (1) to rupture of the pelvic diaphragm from childbirth which, if extensive and not properly repaired, may after a time weaken the abdominal supports and not only the uterus but the intestines may become displaced; (2) to constipation, which by overloading the colon or sigmoid may directly induce ptosis; (3) by tight lacing which tends to force the intestines downward and loosen the liver; (4) to adhesions from inflammatory disease or from operations causing a drag upon the omentum, and by direct traction the colon is pulled downwards, and drawing upon the stomach it in turn is displaced.

No case of enteroptosis should be operated on until medical means have been exhausted without relief. The patient should be treated, if the displacement is of the congenital type, in exactly the same way as are tuberculous patients, and the outdoor life should be especially emphasized. The diet should be carefully regulated and food causing flatulence or constipation avoided. Certain drugs, especially tonics and laxatives, may be needed at times, but are of minor importance. The abdomen must be supported by an efficient bandage, and it is well to advise elevation of the pelvis for an hour or more before retiring. If the patient is young and the thorax movable she should be taught a system

of breathing exercises in order to increase the capacity of the lungs and the size of the upper abdomen.

The question of when to operate is difficult to answer in the congenital type. In general, it may be stated, that if some one organ is markedly ptosed and the symptoms are especially referable to this organ, an operation should be advised, but if the kidneys, stomach, colon, uterus, etc., are all displaced and the symptoms general, operation only complicates the condition, and as Clark has said, "A pathologic condition may be left behind which imposes a still greater burden upon the defective dynamo and makes a more hopeless neurasthenic of the patient than ever."

The acquired cases, on the other hand, offer splendid opportunities for conservative surgery, the type of operation depending upon the condition causing the ptoses. Repair of the perineum, suspension of the uterus, shortening of the uterosacral ligament, suspension of the colon, of the stomach, and of the liver, are the operations most commonly practised. In addition to these the separated recti should be brought together by some operation such as Webster's. A large part of the fat may be excised from a pendulous abdomen, as recently practised by Howard Kelly, or the oblique muscles may be strengthened by some such operation as the one recently published by Coffey. In recent years a number of operators have proposed excision of part or all of the colon. Dr. Müller commends the excision of most of the transverse colon or of the sigmoid in selected cases as it undoubtedly will be frequently performed in the future, but believes that Lane's proposal to excise the entire colon and anastomose the ileum to the sigmoid is unnecessarily severe and certain of a high mortality. The operation of iliosigmoidostomy with exclusion of the colon is not rational and will probably fall by the wayside, the experimental work being decidedly against its value.

Finally, he urged the necessity for caution in these cases, as too much operating can easily be done and the results if bad are almost irremediable. The surgeon should endeavor to grasp the salient points in the cases, repair the major lesion and trust to his after-treatment to finish the cure of his patient.

Dr. William L. Rodman said with regard to gastroptosis, he personally had believed it unwise to operate on the majority of these cases, yet there are exceptional ones demanding operation. He had recently encountered such a case in a patient referred to

him by Drs. Anders and Pfahler. The patient was a small woman and the degree of dilatation and displacement of the stomach was so marked that the medical men considered that the case required operation. She vomited constantly, being unable to keep anything on her stomach. Dr. Pfahler had skiagrams made several years ago and some made more recently, indicating that the stomach was twice or thrice the size it should be. The stomach was so large that it was in the pelvis; this naturally produced a kinking at the pylorus, and interfered with the organ emptying itself. It seemed that nothing short of a pylorectomy would do any good. Between one-third and one-half of the stomach was removed and the remaining portion sutured to the parietal peritoneum or anterior abdominal wall. There has been a skiagram taken since the operation, a day or two before she left the hospital, which shows now the remaining part of the stomach in good position. She has not vomited since the operation; she is putting on flesh. This is one case in which operative interference was undoubtedly warranted.

We probably have been remiss in the past in not operating on more of these cases. Undoubtedly, however, the old rule that where there is general dropping of all the viscera operation is not indicated, holds good; but, where the ptosis is limited, operation is both desirable and advisable.

CHROMO-URETEROSCOPY IN FUNCTIONAL KIDNEY DIAGNOSIS.

Dr. B. A. Thomas read a paper with the above title.

Dr. Thomas further remarked that in chromo-ureteroscopy it is desirable to insure a perfectly colorless fluid content of the bladder, and he believes this, in many instances, can be obtained only by prolonged irrigation. In bad cases of hæmaturia or pyuria it becomes positively essential. This can best be obtained and maintained by an evacuation cystoscope which permits of frequent and speedy evacuation and refilling of the bladder, because very frequently the bladder content may become clouded and it will be impossible to judge as to the character of the elimination of the dye. An absolutely brilliant illumination is necessary so that the landmarks in the bladder as well as a weak color reaction will be distinctly visible. If these two conditions are not secured, in certain cases where there has been

chronic retention of urine or chronic parenchymatous nephritis, in which diseases the elimination of the indigo as a light blue will simply ooze out of the ureteral orifices instead of being ejected as a spurt, judgment of the test will be vitiated and conducive to erroneous conclusions.

It would be of value to one undertaking the work for the first time to have the history and know the physical examination of his case. So far as the results of the cases here reported are concerned, Dr. Thomas refers the questioner to a careful review of the charts, noting the time of elimination and color reaction in detail, for it was with respect to these observations alone, to prove their value or worthlessness, that the charts were compiled.