



Hieronymus Bosch (1450–1516): Paleopathology of the Medieval Disabled and its Relation to the Bone and Joint Decade 2000–2010

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Abstract

Background: At the start of the Bone and Joint Decade 2000–2010, a paleopathologic study of the physically disabled may yield information and insight on the prevalence of crippling disorders and attitudes towards the afflicted in the past compared to today.

Objective: To analyze “The procession of the Cripples,” a representative drawing of 31 disabled individuals by Hieronymus Bosch in 1500.

Methods: Three specialists – a rheumatologist, an orthopedic surgeon and a neurologist – analyzed each case by problem-solving means and clinical reasoning in order to formulate a consensus on the most likely diagnosis.

Results: This iconographic study of cripples in the sixteenth century reveals that the most common crippling disorder was not a neural form of leprosy, but rather that other disorders were also prevalent, such as congenital malformation, dry gangrene due to ergotism, post-traumatic amputations, infectious diseases (Pott’s, syphilis), and even simulators. The drawings show characteristic coping patterns and different kinds of crutches and aids.

Conclusion: A correct clinical diagnosis can be reached through the collaboration of a rheumatologist, an orthopedist and a neurologist. The Bone and Joint Decade Project, calling for attention and education with respect to musculoskeletal disorders, should reduce the impact and burden of crippling diseases worldwide through early clinical diagnosis and appropriate treatment.

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What rather than how, content rather than form, these are the problems that absorb the art lover when first encountering the phenomenon of Jerome Bosch.

Max Friedländer [1]

The visual arts, especially in combination with historical data, can be an important tool for paleopathological research. Works of art of different kinds may serve as a source of evidence of

disease and contribute to a better understanding of the natural history of the disease.

When searching for the paleopathology of musculoskeletal disorders in pictures [2–4], one encounters many paintings and miniatures of the medieval era depicting the physically disabled, particularly lower limb amputees. They are usually considered to be victims of leprosy. Helmut Vogt, in his book *Das Bild des Kranken* [5], states that the neural form of leprosy was the most common cause, but proposes that a differential diagnosis of joint tuberculosis, polyarthritis, osteomyelitis, lues (syphilis) and war wounds could be made. However, other diagnostic possibilities have to be considered, in particular congenital malformations and dry gangrene due to ergotism. Ergotism was epidemic in medieval times in the Netherlands.

This paper analyzes polyclinically a representative early picture of the physically disabled and discusses the most likely working diagnosis for these historical cases by problem-solving means and clinical reasoning [5].

A famous drawing representing “The procession of the cripples” by Hieronymus Bosch (Albertina Museum, Vienna) will be analyzed in detail [Figure 1]. This masterpiece of medieval imaging, executed 500 years ago, realistically depicts 31 disabled cases. Available data, derived from the pictures, are collected case by case (age, gender, socioeconomic aspects, major alterations, associated features) and discussed, taking into account the most common disorders for this historical period and region of the world, in order to suggest a working diagnosis and a differential diagnosis. This picture by Bosch (Albertina Museum, Vienna) should not be confused with a copy made by J.H. Cock in 1599, which was modified to such an extent that a number of clinical characteristics are no longer present [6].

The data

Figure 2 summarizes the individual clinical characteristics, major alterations and associated features, and the working diagnoses of 31 cases represented in Bosch’s drawing of the “Procession of the cripples” (Albertina Museum, Vienna).



Figure 1. “The Procession of the Cripples,” drawing by Hieronymus Bosch (1450–1516), Albertina Museum, Vienna (with permission).

The cases comprise 84% men and 16% women. In one-fourth of the cases, the handicap could be assigned to a congenital developmental disorder: 23% hemimelia (case no. 5), meningo-myelocele or spina bifida (no. 7, 13 and 25), arthrogyrosis (no. 17), tibial hypogenesis (no. 19 and 22), sacral agenesis (no. 31), and spastic diplegia (cerebral palsy) 7% (no. 15 and 23).

Ergotism was suspected in three cases (no. 2, 14 and 26) and leprosy in three (no. 4, 8 and 27). Post-traumatic amputation due to a battle or other trauma was likely in three cases (no. 3, 10 and 28). One case (no. 11) with Charcot joints was diagnosed as a syphilis sufferer with tabes dorsalis. Pott’s disease is obvious in two cases (no. 2 and 30) with marked hyperkyphosis. In another case (no. 12), neurofibromatosis was suspected because of associated back and leg deformities.

Sequelae of poliomyelitis were seen in one case (no. 24), and sequelae of generalized atherosclerosis, amputation of the lower leg and spastic hemiplegia in another (no. 16). In one case the handicap was due to blindness (no. 18). Four cases (no. 1, 6,

9 and 29) were suspected of simulating disability, one of whom (no. 6) is an alcoholic with possible polyneuritis.

The drawing shows very characteristic coping patterns as well as the use of walking aids for crippling musculoskeletal disease. Most of the cases use axilla crutches, some of them with an anti-slip gadget (no. 8 and 14), while some walk on all fours with the aid of hand-quadrupod devices. Pylon orthoses were used in two cases (no. 10 and 19).

Although none had a rattle, which was obligatory for leprosy on the street, 55% of the cases were wearing a typical leper’s cape and carrying a food-begging scale.

Diagnosis

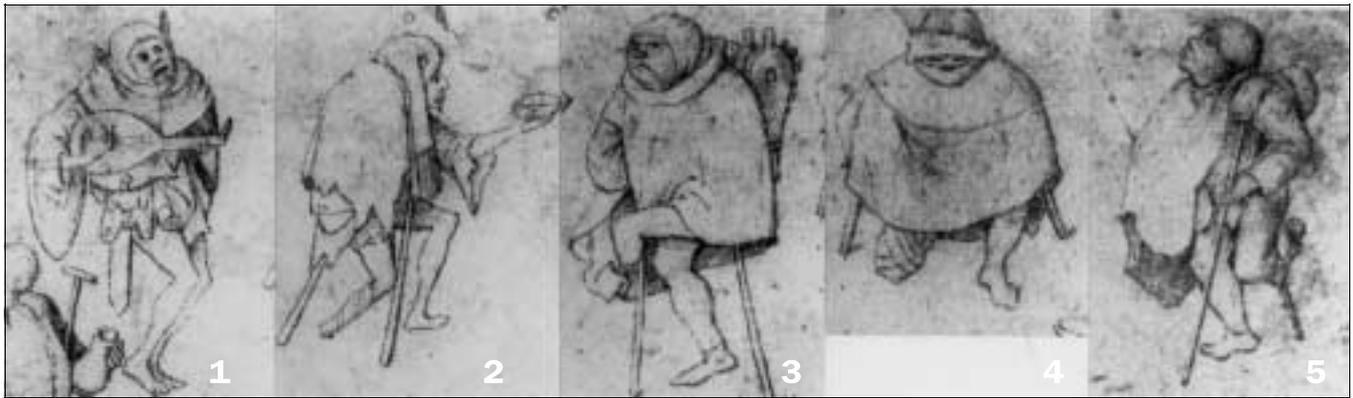
Throughout the period of the declining Roman Empire and the Dark Ages, leprosy was endemic at low levels in Western Europe, but after the Crusaders began streaming back home the number of lepers increased dramatically. During the Middle Ages, the stigma of leprosy was not restricted to the disease as we know it today but was applied to a variety of dermatological and musculoskeletal diseases, only some of which had any degree of contagiousness. Nevertheless, all individuals called lepers were subjected to total ostracism from society,

which was stringently enforced by governmental and ecclesiastical authorities, as in biblical times. Distinctive clothing was mandatory, as was segregation in places of public assembly including places of worship. However, the Order of Lazarus was extremely sympathetic to the care of lepers and the Lazar House soon began to connote a leprosarium. Thousands of these sanctuaries sprung up throughout Europe [7].

Since the leprosy epidemic almost ceased to exist in the sixteenth century, leprosaria in many cities in the Low Lands (Holland and Belgium) were a refuge not only for lepers but also for other disabled people, vagabonds, beggars, the homeless, sodomites, banished murderers and poor pilgrims [7].

In many cities in the Netherlands in the sixteenth century, a two day procession, called “ommegang,” took place on the Monday and Tuesday after Epiphany to collect money for the leprosy house [8]. In 1604, this procession was suspended in Amsterdam. The drawing of Bosch’s “Procession of cripples”

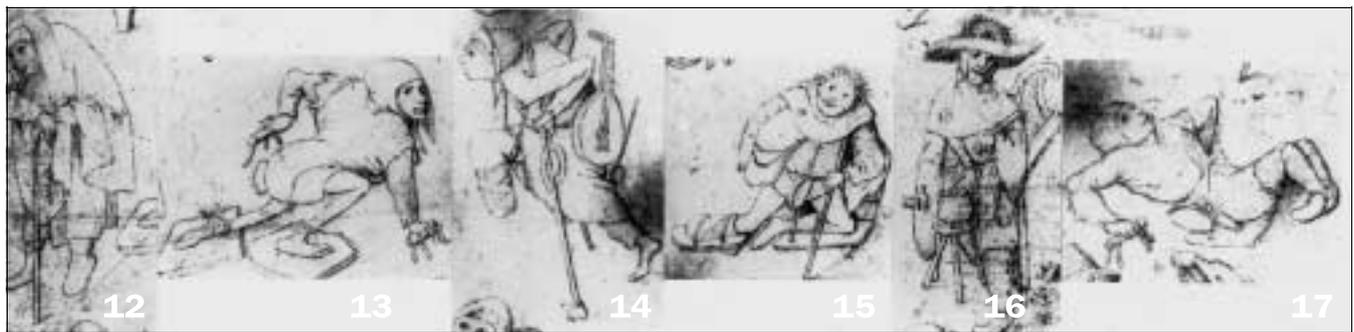
Figure 2. Clinical characteristics and working diagnoses of 31 disabled cases as represented in a drawing by H. Bosch (1500), Albertina Museum, Vienna.



	1	Gender	Age	2	Gender	Age	3	Gender	Age	4	Gender	Age	5	Gender	Age
		Male	15-25		Male	>40		Male	30		Male	>30		Male	30
Main changes	Flexion position hip-knees-feet			Amputation of distal right tibia, hyperkyphosis			Old proximal left tibia amputation, disuse atrophy of left thigh			Recent high amputation of right distal femur, loss of left toes			Flexion contracture left knee, afunctional distal lower limb		
Associated features	Face: mental retardation? Fool's cap, foxtail, playing the lute			Leper's clothing: pilgrim's cape, wooden scale, white ribbon, two crutches			Good general health			Weakness left limb? Leper's clothing, mouth-nose mask			Good general health Face: mental retardation?		
Working diagnosis	1) Simulator 2) Spondylarthropathy 3) Spastic diplegia			1) Ergotism 2) Pott's disease sequelae 3) Hyperostosis vertebralis			Post-traumatic amputation – infection?			1) Leprosy with post-infectious gangrene 2) Neural weakness			1) Hemimelia fibula or tibia 2) Pterygium syndrome		



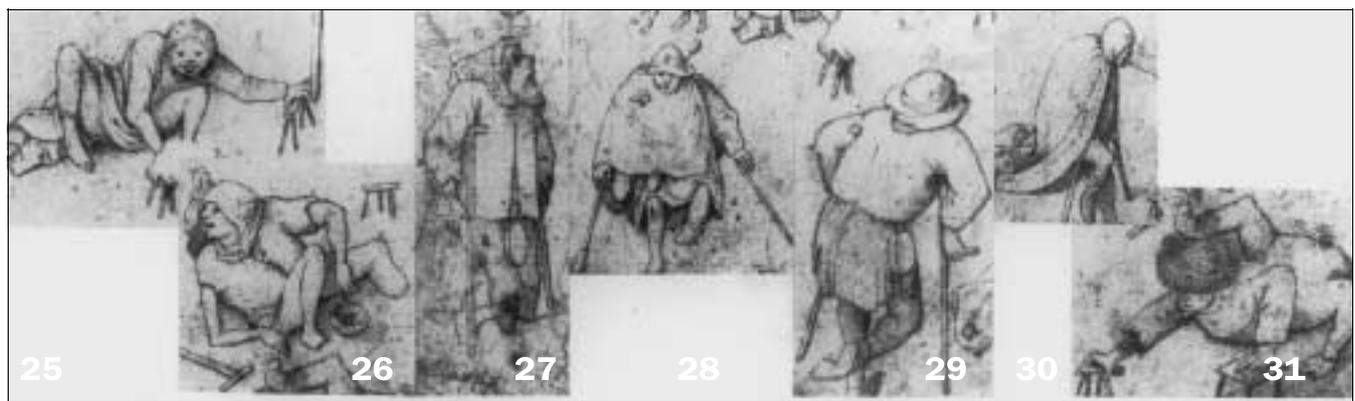
	6	Gender	Age	7	Gender	Age	8	Gender	Age	9	Gender	Age	10	Gender	Age	11	Gender	Age
		Male	>30		Male	20		Male	<30		Male	30		Male	20-30		Male	>30
Main changes	Resting on knees, potbelly			Afunctional distal limbs, equinovarus right foot			Afunctional right leg, flexion contracture of knee, equinus right foot			Afunctional distal part of both limbs			Distal right femur amputation			Left genuvalgum-recurvatum, Charcot joint, amputation right mid-tibia, genuvarum		
Associated features	Wine jar, poster indicating low leg amputation			Carrying lute			Prominent nose and upper lip			Waistcoat, no hat, leather shoulder bag			Pylon prosthesis, playing lute, no walking aid					
Working diagnosis	1) False beggar, simulating amputation 2) Alcoholic polyneuritis			Meningomyelocele or spina bifida			1) Leprosy 2) Congenital hemimelia			1) Simulator 2) Syphilis			Post-traumatic amputation			1) Lues – syphilis 2) Post-infectious osteomyelitis and left amputation		



	12	Gender	Age	13	Gender	Age	14	Gender	Age	15	Gender	Age	16	Gender	Age	17	Gender	Age
		Male	>40		Male	30		Female	30		Male	15		Male	>40		Male	15
Main changes	Elephantiasis of left limb + equinus foot, kyphoscoliosis			Paralysis and afunctionality in both lower limbs, some muscle activity in hip and knees			Recent mid-tibia amputation of left limb			Afunctional lower limbs, afunctional right arm			High amputation of right limb, flexion deformity in left hand, equinovarus left foot			Severe contracture joints in both lower limbs, absence of muscle development		
Associated features	Paretic right arm?			Incontinence			Neck string holding up thigh			Pilgrim's insignia			Bishop's hat, pilgrim's insignia					
Working diagnosis	1) Neurofibromatosis 2) Pott's disease			Spina bifida			Ergotism			1) Spastic triplegia 2) Post-infectious amputation of right foot			1) Hemiplegia 2) Diabetic gangrene?			Arthrogryposis		



	18	Gender	Age	19	Gender	Age	20	Gender	Age	21	Gender	Age	22	Gender	Age	23	Gender	Age	24	Gender	Age
		Female	>30		Female	>40		Male	>40		Male	>40		Male	>30		Male	>30		Male	20-30
Main changes	Walks close to companion			Distal atrophy left limb			Beggar with dog and "hurdy-gurdy"			Left hemiparesis, facial expression of mental retardation, scoliosis			Varus deformity right and left knee, shortened paralytic right leg, equinovarus right foot			Paralysis of left lower limb, weak right lower limb, prognatism			Hypertrophy and short left limb, atrophy right lower limb – genurecurvatum		
Associated features	Long stick			Long stick, pylon orthesis									Good general health			Scissors gait? Only one stick					
Working diagnosis	Blindness			1) Tibial agenesis 2) Ergotism			None			Congenital hemiplegia			Tibial hypoplasia and varus deformity of left leg			1) Cerebral palsy 2) Simulator?			Poliomyelitis right leg, thrombophlebitis, ulcera left leg		



	25	Gender	Age	26	Gender	Age	27	Gender	Age	28	Gender	Age	29	Gender	Age	30	Gender	Age	31	Gender	Age
	Male		15-20	Female		20	Male		>40	Male		20-30	Male		30	Female		>40	Male		20-30
Main changes	Total afunctionality of both lower limbs – paresis, equinus			Amputation of mid-tibia and right toes, missing right fifth finger, hypertrophy of right arm			Afunctional distal part of both limbs, facial deformity			Afunctional left limb with secondary equinovarus of left foot			Flexion deformity of right knee, equinovarus in right foot			Afunctional right limb, flexion contracture of right hip, dorsal kyphosis			Feet deformity, total afunctionality of both lower limbs, pelvic hypotrophy and instability		
Associated features	Mental retardation, protruding tongue									Pilgrim's insignia			No muscle wasting								
Working diagnosis	Meningomyelocele			Ergotism			Leprosy			Post-traumatic deformity, battle wound?			1) Simulator 2) Post-traumatic deformity			Pott's disease in spine, tuberculosis in hip, cold abscess?			Sacral agenesis		

discussed in this report is most probably an illustration of this yearly two day procession.

In addition to the banning of leprosy cases in society, a negative attitude existed toward all people with disabilities due to other causes [9]. In many sixteenth century paintings of "The temptation of St. Anthony," the "diabolic beggars" (le diable boîteux) are often the physically disabled. In a painting of the Flemish-Dutch School (in the Escorial Museum, Spain), the beggar shows typical features of rheumatoid arthritis [4].

Lepers, however, were permitted to enter the city and to beg at the church door. As begging was profitable, other unfortunate individuals simulated the leper. Lepers had to be registered and had to wear distinctive clothing – a gray pilgrim's cape, and a black hat with a white ribbon as a sign of baptism and confession of guilt, a beggar's wallet (*bésace*) and a rattle. In Bosch's procession, 55% of the cases are wearing a typical leper's cape and 19% a white ribbon; and almost all except cases no. 9, 15 and 25 had a head cover. Five (no. 7, 9, 15, 16 and 28) had a pilgrim's insignia on their clothing – a shell with two pilgrim staffs.

This iconographic study of Bosch's procession reveals that in the Low Lands of the sixteenth century the most common crippling disorder was not a neural form of leprosy as suggested by Helmut Vogt [5], but that other disorders were prevalent as well, such as congenital malformations and dry gangrene due to ergotism. Epidemics of ergotism raged in Europe from the Middle Ages until as late as 1816. This

disease was caused by *Claviceps purpurea*, a fungus that appeared on rye grain, one of the bread staples of the poorer classes. The fungus is also the source of the drug ergot. One of the two forms of the diseases was characterized by intense burning pain in the affected parts. Gangrene could involve only the nails, or the fingers or toes, or whole limbs, the gangrenous part separating spontaneously without pain or loss of blood. The disease is also known as St. Anthony's fire, so called because the bones of St. Anthony – the great Egyptian hermit – were eventually transported to southern France where they miraculously cured the disease.

A woodcut by Johannes Wechtlin (1490–1530) illustrates clearly the burning hand and gangrene of a victim of ergotism appealing to St. Anthony [Figure 3]. In the museum Unter Linden in Colmar (France), a more dramatic case of ergotism is seen in the Isenheimer Altar piece by Matthias Grünewald (1512–1516), "The temptation of St. Anthony." This painting depicts not only dry gangrene of the fingers and feet but also the skin manifestations of livedo, skin gangrene and multiple vasculitic lesions. Grünewald did this painting for the Antoniter monastery in Isenheim, which cared specifically for cases of ergotism. Charcot and Richer [10] incorrectly attributed the diagnosis of syphilis to this case, and H. Meige [11] was convinced that this was a case of mutilating leprosy.

The clinical diagnosis of ergotism was made in three of the cases in Bosch's etch (no. 2, 14 and 26). Cases 2, 14 and 26 had a recent unilateral distal lower limb amputation, and case 26



Figure 3. “St. Anthony’s Fire or Ergotism,” by Johannes Wechtlin (1490–1530): colored woodcut. *Feldbuch der Wundartznei*, Strassbourg, 1540.

also had amputation of the toes and the fifth finger of his right hand. The first case (no. 2) is an older man with prominent dorsal kyphosis, suggestive of the sequelae of Pott’s disease of the dorsal spine or hyperostosis vertebralis (Forestier’s disease). Case no. 14 is a young woman who has suspended her amputated leg on a sling hanging from her neck.

Post-traumatic unilateral lower limb amputation due to battle or other trauma is suspected in three healthy-looking young men (no. 3, 10 and 28). Firearms were introduced in Europe in the fourteenth century, and although gunshot wounds were unlikely during Bosch’s time, wounds due to arrows and sword cuts must have been frequent, often with infection requiring amputation. The battle wounds before the time of Ambroise Paré (1517–1590) were treated with cautery and/or boiling oil that resulted in fever, terrible pain and inflamed wounds. As a result, amputation had to be performed as a life-saving measure [12].

The diagnosis of leprosy in three cases (no. 4, 8 and 27) is based on loss of limb function due to dry gangrene and/or peripheral neuropathy, and additional clinical features such as a deformed face, nose and upper lip, which is disguised by a mask in case no. 4. Since the onset of symptoms is gradual, polyarthritis similar to rheumatoid arthritis was often present but overlooked [12]. Prodromal symptoms of a toxemic nature may be present, followed by pains referred to the peripheral nerves in the limbs and often by a sense of numbness of the extremities. Symptoms tend to be symmetrical, with anesthesia of the “glove and stocking” distribution developing, together with atrophic paralysis of the muscles of the peripheral segments of the limbs. Facial anesthesia and paralysis due to involvement of the fifth and seventh cranial nerves are often seen. Trophic changes are conspicuous in the limbs. Bullae, ulceration, and necrosis of the phalanges occur, and all the fingers may be lost. Thickening of the peripheral nerves is usually, but not invariably, palpable. The additional feature of painful red nodules over the face and limbs is more often seen in borderline lepromatous disease [13].

The diagnosis of syphilis with *tabes dorsalis* in case no. 11 is based on Charcot joints and ataxia. The recent amputation could be due to infection, *malum perforans* and osteomyelitis. *Tabes dorsalis* is the most frequent cause of arthropathy (Charcot joints) in cases affected by neurosyphilis. Syphilis first appeared in Europe in 1493 in Barcelona, and in 1496 the epidemic spread to the Netherlands [13].

The marked dorsal hyperkyphosis in three elderly cases (no. 2, 12 and 30) is suggestive of Pott’s disease – tuberculosis of the dorsal spine. However, senile hyperkyphosis secondary to spinal spondylosis or Forestier’s disease – hyperostosis vertebralis in the male (case no.2) and vertebral osteoporosis with wedging in the female (no. 30) – has to be kept in mind as an alternative. The recent distal amputation in case no. 2 may be due to ergotism, and the bandaged right limb with hip flexion in case 30 could be related to a cold abscess and varicose ulcera.

The kyphoscoliosis in case no. 12 is associated with an enlarged left lower limb and spastic right arm. All these features could be due to neurofibromatosis. Neurofibromatosis (Von Recklinghausen’s disease) is characterized by café-au-lait patches, tumors in nerve trunks, overgrowth of tissues, and various skeletal manifestations (e.g., scoliosis, pseudoarthrosis of the tibia and enlargement of an entire limb).

In four cases (no. 1, 6, 9 and 29), the general appearance and associated features raise the suspicion that these individuals were mimicking a crippling disorder. Case no. 6 with his potbelly and wine jar is obviously an alcoholic. In front of him is a poster indicating an amputated leg. He is begging in a kneeling position, however it is difficult to kneel when a leg is amputated or with any other derangement of the lower limbs. Case no. 29 is walking with flexed knee and equinovarus position of the right foot; the size of the muscle indicates a healthy leg. A probable simulator or false leper is case no. 1, the leader of the procession. Playing a lute and singing, he stands in a flexed

position of the hip, knees and toes. He is dressed as a clown with a fool's cap and is wearing a foxtail at his waist. A foxtail in medieval drawings and paintings is associated with a hypocrite [4]. Hip and knee flexion deformities occur in the rheumatic diseases group spondylarthropathy, including ankylosing spondylitis, Reiter's disease and psoriatic spondyloarthropathy. Psoriasis has been confused with lepromatous skin lesions in the past. His bilateral spastic appearance could indicate a congenital diplegia (see further). Case no. 9, a middle-aged man with unkempt hair, wearing a waistcoat, pilgrim's insignia and a hunter's leather shoulder bag, and sliding over the floor in a kneeling position on two boards using the power of his arms, brings to mind the image of the prodigal son in the Bible (Luke 15: 11–32). Although well dressed and apparently educated, he is now homeless and begging as a cripple. Like case no. 6, his position is not compatible with an organic lesion, paralytic or spastic, or with an amputation of the lower limb. His thigh muscles are still well preserved and not at all hypotrophic, which one would expect in a disuse situation. He is most likely simulating a cripple and Bosch gives a further hint of his diagnosis by exposing a foxtail in the middle of his waist, an indication of suspicious behavior. On the other hand, he might be infected with a sexually acquired disease such as syphilis, with the resultant *tabes dorsalis* and *malum perforans* on the foot soles as well as mental deterioration, which could explain his strange behavior. He might also have Reiter's disease, which affects mainly the lower limbs and the skin (*hyperkeratosis blenorragica* on the foot soles). If one of these syndromes were true he would have shown his feet.

In two cases (no. 15 and 23), spastic paralysis of the lower limbs due to congenital diplegia is manifest with scissors gait in case no. 23. Case no. 15 also has a spastic arm and some difficulty with the right foot and ankle. Congenital diplegia, a synonym of congenital spastic paralysis, Little's disease, atrophic lobar sclerosis, and cerebral palsy, includes a group of cases characterized by bilateral and symmetrical disturbances of motility that are present from birth and subsequently remain stationary or show a tendency towards improvement. The lesions involve chiefly the corticospinal tracts, causing weakness and spasticity that are most conspicuous in the lower limbs; mental defect, involuntary movements and ataxia may also be present. Tone is increased in the extensors and adductors so that the limb is held in extension, with plantar flexion of the foot and some degree of adduction. Gait is stiff, the toes scrape the ground, and if the adduction and spasticity are severe there is a "scissors gait."

Major congenital development disorders are seen in several cases: hemimelia of the left lower leg or a pterygium syndrome (congenital contractures of joints with webbing of skin on the flexion side) in case no. 5; meningocele or spina bifida in case no. 7 (possible), 13 and 25 (no. 25 also has severe equinovarus and mental retardation); arthrogryposis in no. 17; tibial agenesis in two cases (no. 19 and 22); and sacral agenesis in 31.

Arthrogryposis is a term used to describe a heterogenous

group of congenital disorders characterized by extreme stiffness and contractures of joints with absence of muscle development around them. Clinical symptoms of a spastic hemiplegia on the left side and a problematic right lower limb is seen in case no. 16, called the "crippled bishop" [10] because of his special head dressing. He seems also to be carrying a harp and has a pilgrim's insignia on his cape. Because he looks older than the others, a suspicion of generalized atherosclerotic disease comes to mind, to be followed by diabetes mellitus, leading to atherosclerotic thrombosis of the carotid artery with cerebral infarction and arterial thrombosis of the iliacs with gangrene and amputation.

The two cases (no. 18 and 19) walking closely together represent the proverb "Let the cripple guide the blind." The blind person (no. 18) who has no obvious musculoskeletal alterations is touching the back of her guide in order to know the direction and the unevenness of the terrain. Her hat with the wide brim is pushed almost over the eyes because of photophobia due to chronic corneal inflammation (*scrophulosis*) or due to cataract. The older woman (no. 19) with the long crooked stick who is guiding the blind girl, is walking with a pylon orthosis because of left tibial agenesis or amputation after dry gangrene due to ergotism or diabetes. Although she has small piercing eyes, she does not seem to be completely blind – her stick is not pointing forward as blind people do in order to detect obstructions, and she is looking downwards while blind people look straight ahead in order to avoid bumping their head. Another hypothesis is that she is a diabetic with cataract and amputation following gangrene.

The other couple in the procession (no. 20 and 21) appear to be very poor. The man (no. 20) is playing the hurdy-gurdy – the beggar's musical instrument. His wife (no. 21), behind him, has a longstanding left hemiplegia (congenital?) with very marked disuse signs, no remaining muscles and a string to hold up her arm; her face indicates mental retardation. Her bare left limb and feet are explicitly exposed to attract attention and compassion.

The last case (no. 24), a young man wearing a fur hat, has a very thin lower limb with a normal arm on the right side as seen in poliomyelitis, but his left lower limb seems to give him more trouble. Also visible is elephantiasis and skin plaques (*ulcera?*), and a functionality.

Commentary

Applying simple problem-solving methods to Bosch's 31 physically disabled cases etched 500 years ago, it was possible to propose a specific working diagnosis for each case and a possible alternative if the working diagnosis could not be confirmed by anamnesis and technical investigation. Although the latter were not possible in this study, a paleopathological prevalence of crippling diseases could be proposed. There was a large variety of crippling disorders ranging from infectious, traumatic, congenital and metabolic to hysterical related etiologies. Neither leprosy nor syphilis was the main cause of

crippling in the medieval era. We learned that these unfortunate individuals were expelled from society, lived in marginal conditions, and had to beg and perform music for their daily needs and care. We have seen how they coped with their handicap with axilla crutches, hand quadripods and sliding boards. Limb amputation for dry gangrene due to ergotism or post-traumatic wound complications were the most prevalent causes of disability, besides congenital deformities. Surprisingly, mimicking a disability was also very common since begging was more lucrative and easier than working.

Unfortunately, the negative attitude to crippling disorders in the past still exists regarding chronic musculoskeletal disorders. Cancer, heart, pulmonary and gastrointestinal disorders dominate medical and popular attention and research activities. Yet, chronic musculoskeletal diseases are more prevalent [14], cost more and cause longer suffering. In modern society, musculoskeletal crippling disorders have a wide etiology and a high impact on society. Tuberculosis, leprosy and poliomyelitis, although all curable and preventable, are still with us, especially in developing countries. War-related crippling, in particular landmines, is a major problem in parts of the world. People born with congenital malformations are living longer. The aging of the population is associated with an increasing number of handicaps – atheromatosis, cerebrovascular accidents, osteoarthritis, multiple sclerosis, degenerative muscle disorders, diabetes, gangrene, Parkinson, spinal stenosis, rheumatoid arthritis and osteoporotic fractures. Moreover, modern society is plagued with psychological stress syndromes, work and road accidents, and recently human immunodeficiency virus-associated arthritis and fibromyalgia. In developed countries, the mobility of the disabled is considerably improved by corrective surgery such as joint replacement and lengthening of the bones on the one hand, and by motorized wheelchairs and better accessibility in houses and official buildings on the other. Most disabled people today live with their families and are no longer segregated.

The impact of these acute and chronic crippling disorders – 30% of general practice and 2% of the gross national product in the United States – is not reflected in today's medical curricula, care, management and research. It is because of this that the ILAR-UMER 2000 project for undergraduate education in rheumatology and the Bone and Joint Decade 2000–2010 were launched [14,15]. With simple observation and a thorough clinical examination (if taught at medical and allied health professionals schools), most of these disorders can now be diagnosed at an early stage and disabilities can be prevented by global vaccination, diet, psychological counseling, and appropriate drug therapy. It would seem that this paleopathologic

study of the disabled in the past is still relevant to our modern era.

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References

1. Friedländer MJ. From Van Eyck to Bruegel. Cornell University Press NY, Phaidon Press Ltd., 1956.
2. Dequeker J. Arthritis in Flemish paintings (1400-1700). *Br Med J* 1977;1:1203–5.
3. Dequeker J. Paleopathology of rheumatism in paintings. In: Ortner DJ, Aufderheide AC, eds. *Human Paleopathology: Current Syntheses and Future Options*. Washington, Smithsonian Institution Press, 1991:216–20.
4. Dequeker J, Rico M. Rheumatoid arthritis like deformities in an early 16th century painting of the Flemish-Dutch School. *JAMA* 1991;268:249–51.
5. Vogt H. *Das Bild des Kranken*. Munich: JF Lehmanns Verlag, 1969:384.
6. Cock JH. *Prentenkabinet Koninklijke Bibliotheek Albert I Brussel*, S1 8548.
7. Lyons AS, Petrucelli RS. *Medicine: An Illustrated History*. New York, NY: Abrams HN Publisher, 1978:339,345,381.
8. Toth-Ubens M. *Verloren beelden van miserabele bedelaars*. Lochem, Netherlands: De Tijdstroom, 1987:30.
9. Vandenbroeck P. *Jheronimus Bosch: Tussen Volksleven en Stads-cultuur*. Berchem, Belgium: EPO Publication 1987:58–62.
10. Charcot JM, Richer P. *Les difformés et les malades dans l'art*. 1889 – unchanged reprint, BM Israël, Amsterdam, 1972.
11. Meige H. *Le lèpre dans l'art*. Nouvelle iconographie de la Salpêtrier. Tome dixième. Paris, Masson et Cie, 1897:417–57.
12. Gibson T, Ahsan Q, Hussein K. Arthritis of leprosy. *Br J Rheumatol* 1994;33: 963–6.
13. Schreiber W, Mathys FK. *Infection*. Basle: Editions Roche, 1987:57.
14. Dequeker J, Rasker H. High prevalence and impact of rheumatic diseases is not reflected in the medical curriculum: the ILAR Undergraduate Medical Education in Rheumatology (UMER) 2000 Project. Together everybody achieves more. *J Rheumatol* 1998;25:1037–40.
15. Dequeker J, Rasker JJ. Rheumatology and the Bone and Joint Decade 2000-2010. ILAR UMER 2000 Project. *Clin Rheumatol* 2000;19:79–81.

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I am opposed to parliamentary democracy and the power of the press, because they are the means by which the herd become masters.

Nietzsche (1844–1900), German philosopher