



# Making Sense of Things

*Archaeologies of Sensory Perception*

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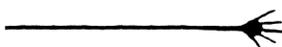
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# Tracing Pain: Identifying Suffering in Skeletal Remains

Anna Kjellström



Pain is part of life. This is an obvious truism for most of us, at least at some point in our existence. From an historical perspective, the view on pain has changed enormously over the centuries. In antiquity, pain was believed to be cured with pain and it was considered an integral part of life and of what it is to be human. No clear distinctions existed to separate the body from the soul. Socrates put forward that the mere absence of pain is pleasure, though he considered the entities inseparable (Rey 1995:38). A common view was, in line with other contemporary stoic beliefs, that pain existed to be endured. In contrast, according to the Epicureans all types of discomfort were evil and should be avoided. During the Middle Ages in the western world, the antique stoic principle of suffering was retained, now bolstered by Christian beliefs. The affliction of Christ, the *persecution* of saints and the horridness of purgatory is meticulously depicted in paintings and described in texts where pain and suffering is closely linked to salvation and redemption. It has been suggested that the medieval Christian ideas of pain as a 'divine gift' or sacrificial offering was an attempt to make sense of the physical suffering of the times (Rey 1995:49). In the nineteenth century the association between pain and religion weakened, and it was instead considered a physiological state and a medical challenge. This is also the starting point for a more systematic exploration and study of drug treatment and pain relief.

Within different belief-systems, both religious and ideological/political, pain has been used as a threat for control and punishment as well as a way to salvation. Current debates regarding the right to inflict torture, and whether the end justifies the means, show that pain still plays an important political role in society today (Rejali 2008). Flagellants or other types of self-tormentors display their devotion and the strength of their beliefs through agony. Pain may also be associated with a variety of social inactions of a more sublime character. Gender related regulations exist in a more or less manifest way in most societies (Johansson 2004). In some groups both boys and girls undergo rites of passage (or basic discipline) that includes a physical procedure where pain, though not the fundamental goal, is an unavoidable component. Childbirth in connection with ideas of womanhood is another area where gender ideology and pain are closely intermingled (Callister et al. 2003; cf. White 2004:1489). Socio-cultural notions about beauty and social status make people endure painful physical transformations in the form of tattoos, scarring, piercing, hair plugs or more advanced plastic surgery. Social factors may also affect the allocation of pain in medical disorders such as fibromyalgia or chronic fatigue syndrome (Buskila and Cohen 2007; Deary et al. 2007).

Pain is the most common reason for seeking medical care and is of help in diagnosing a disease and its subsequent treatment. There is an immense quantity of research about pain today within a variety of disciplines from medicine to philosophy (e.g. Aydede 2009). Since the word *pain* is synonymous with both experiences related to physical malfunctions as well as a sense of distress and negative emotions, it may be discussed in a variety of contexts (Perl 2007). This brief survey strives to focus on questions associated with pain in bioarchaeology which have not been adequately explored, and where the theoretical discussion about pain experienced is first and foremost as bodily phenomena. A method is suggested for how to interpret pain in an osteological context. The discussion should be regarded as a tentative effort to grasp an elusive, but unquestionably universal, part of human existence.

### The physiology of pain

Pain is a warning signal showing the body that there is a risk of injury. The sensory system, including peripheral nerves in the skin, muscles and viscera, reacts from different stimuli such as cold, heat, pressure, and

touch. At the end of the nerves stimuli-specialized *receptors* transduce the electric impulse to the spinal cord and the brain. Due to over-stimulation of these receptors, or because of a reaction caused by tissue damage (a release of molecules from destroyed cells) in the free nerve endings, the *nociceptors*, a perception of pain may arise (Carlsson and Nachemson 2000). For instance, an inflammation is a tissue-damaging stimuli which activates a *nociception*, i.e. the objective “reception, conduction and central processing of noxious signals” (Ward and Linden 2008:119). However, this is not actually synonymous with *pain*, which is a more subjective sensation. Depending on affected tissue an allocation is made between visceral (located in the internal organs) and somatic pain (located at the skin muscles and joints). Somatic pain may further be subdivided into superficial and deep pain. The former is often associated with well-defined localized pain (e.g. piercing of the skin) whereas the latter (pain in muscles, bone or joints) is generally diffuse and dull (Ward and Linden 2008:119). Pain also differs in intensity between an initial acute phase, where the pain is sharp, followed by a second delayed, number sensation (Julius and Basbaum 2001). In response to these processes the suffering individual may start to sweat, blood pressure may drop and nausea may occur. The same physiologic processes displayed in humans today and investigated by modern clinical pain researchers were most likely also experienced by humans in prehistory.

Even though there are no objective methods for measuring pain, attempts have been made to employ a subjective scale (e.g. VAS – visual analogue scale) to approximate the intensity of pain based on the self-reports or observations of the patient (Jylli 2001). The imprecise character of this scale attests to the fact that the sensation is a complex combination of different parameters. Based on the mechanisms causing pain there are four different types: nociceptive pain (pain associated with tissue damage); neuralgia (pain due to damage to the nerves); idiopathic pain (pain with an unknown cause); psychogenic pain (pain associated with mental illness). Furthermore, according to the *International Association for the Study of Pain*, pain has been defined as an “unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage” (IASP 1994). In all, it is clear that a person does not need to be physically ill or injured to suffer and experience discomfort. Pain has several complex dimensions and is closely linked to our ability to recollect preceding actions, i.e. the body is affected by our mental state and a ‘pain memory’ may develop.

For example, due to previously experienced pain, fear may lower the pain threshold (Carlsson and Nachemson 2000:267). Even though we can endure shorter periods of pain it is exhausting and difficult to adapt to longer periods of chronic pain (Frew 2004). After a while a hypersensitivity of the injured area may develop and it is possible to experience pain even from normal activities. This hypersensitivity may remain for a long time after the original wound has healed and the chronic pain may develop into a medical condition of its own.

Depending on genetics and general physical condition, and exactly like other senses, pain may vary in intensity and time due to cognitive and emotional factors. Clinical studies have shown that factors such as the meaning of pain; the expectation of pain; the education and belief system of an individual and the options for controlling pain, affect the intensity (e.g. Assarsson and Persson 2006; Ericsson and Silvennoinen 2006; Deary et al. 2007). This shows that physiological and cultural factors play an important part in the experience of pain.

### How can we acknowledge pain in prehistory?

In discussing pain in Scandinavian prehistory it is essential to acknowledge a three-step process which can be associated with the sensation. (1) *The general physiological process* which is (2) *individually experienced* but (3) *culturally expressed*. These three steps can be further dissected.

#### The physiological process

With modern research and technology at hand it is possible to understand the first stage almost to the full. As long as we can accept the notion of uniformitarianism for the sensory system over time (i.e. natural processes operate the same today as they did in earlier times) it is possible to obtain information about physical factors relating to pain and associated mechanisms from standard medical manuals.

#### The individual experience

The second step is impossible to deal with if we are trying to reach the innermost feelings of a particular individual. However, by using analogies with patient anamneses from history and social anthropology we may at least come closer to understanding some of the suffering

an individual had to endure in life. However, in historical records it is primarily in the ideas of scholars where one finds traces of pain being acknowledged, not directly described by the sufferers (e.g. Rey 1995:4; Qvartsell 2004:355). However, there are exceptions. The seventeenth-century English physician Thomas Sydenham suffered from gout and described the pain in agonizing detail:

“The pain which is at first moderate becomes more intense. With its intensity, the chills and shivers increase. After a time this comes to its height, accommodating itself to the bones and ligaments of the tarsus and metatarsus. Now it is violent stretching and tearing of the ligaments. Now it is a gnawing pain, and now a pressure and tightening” (Rey 1995:84).

Anthropological research, defined as comparative studies of human behaviours, demonstrates the complexity of the concept of pain where cultural differences control beliefs and practices (e.g. Oknuki-Tierney 1981; Brihaye et al. 1987; Kleinman 1988; cf. White 2004:1489). The spectra of different actions in relation to pain could be turned to our advantage giving new ideas of how pain as a concept was treated in prehistory. Furthermore, anthropological research presents telling examples of culture clashes when the caretaker and caregiver have different cultural backgrounds (for an overview see Free 2002). As pointed out by Free (2002:144), although the behaviour of an individual is idiosyncratic, “it is most often shared with a significant number of other members of one’s cultural (or subcultural) group”.

According to phenomenological principles it may be possible to widen and discuss the experience of pain (Bengtsson 1988; Kvale 1997). Couceiro-Bueno (2009) who has outlined the full phenomenology of pain on a philosophical level, describes pain as an ontological item. Within modern medicine, phenomenology has been used as an analytical tool to reach a better understanding of different patient groups’ experience of pain and the reactions of relatives (e.g. Svenaeus 2003; Herrman 2006; Richards & Hubbert 2007; Kjellstedt and Grönqvist 2010). According to theories of descriptive phenomenology the focus of research is the experience of a phenomenon by an individual (Polit and Beck 2004). In these studies the researchers try, through in-depth interviews, to describe and fully understand the essence of the pain experienced or its treatment. The results help to highlight significant features and specific factors from the experience of pain among the patients and could be applied to studies of prehistoric societies.

### The cultural expression

The third step in dealing with the cultural expression of pain, as with other types of sociological interaction in archaeology, could be discussed through the material culture. In medieval settings, for instance, artefacts associated with medical care have been found such as tweezers, irons for blood-letting (Kjellström and Wikström 2008:212) and copper plates to splint fractures and prevent infection (SHM 18393). The different types of instruments for trepanation that were deposited as sacrifices at Illerup Ådal, Denmark, which date to the Iron Age (Frölich 2009), are another example. The finds present information about treatment and the general level of medical knowledge in the society. In some contexts it is possible to identify separate buildings associated with the treatment of the sick. Admittedly, many metal objects or institutions such as hospitals are a modern Christian phenomenon. However, there are significant opportunities for obtaining information about health through depictions, representations and iconography, often in societies of great antiquity. A Paleolithic cave painting in Gargas, France, displays negative imprints of hands believed by some scholars to have been mutilated (Napier 1993:129). Various figurines from southern Europe exhibit Pott's disease and endocrine disorders (Wells 1964: plate 52, 64). In addition to cave paintings and sculptures, it is assumed that the tattooed skin of a mummy has offered new knowledge about pain and pain treatment. The tattoos of the south Tyrolean ice-man Ötzi, a 5,200 year old mummy, correspond to lines of skin acupuncture and are believed to signify treatment for pain due to arthrosis (Dorfer et al. 1999). In the same context stone tools such as scrapes, blades and pointers may of course have been used in a variety of ways, but also at least suggest the range of possibilities at hand when dealing with the sick. (Only a handful of European examples have been mentioned above. If pottery, masks, paintings and figurines of Egyptian, American or Asian origin are included, the source material is considerable). Furthermore, biological artefacts such as shells from calcified parasites or micro bacterial DNA offer direct information about prevailing infections and subsequent suffering. In combination with data connected to the climate, economy and diet, a well-founded theory may be proposed about various aspects of health in a particular society. This could be used as the background and introduction for discussions about pain.

## Signs of pain and suffering in the osteological record

Even though pain must have had both a direct and indirect affect on people investigated in bioarchaeology very little is written about it. None of the often-cited paleopathology textbooks has the word *pain* in its index (Steinbock 1976; Ortner and Putchar 1981; Roberts and Manchester 1997; Aufderheide and Rodriguez-Martin 1998; Ortner 2003; Pinhasi & Mays 2008; Waldron 2009). The same dearth is generally found in osteological journals, although one paper has been found which deals with back pain and the implications for the bioarchaeological record (Faccia and Williams 2008). The reason for the almost total avoidance of the subject most likely relates to the difficulties in dealing with such an individually perceived and culturally controlled issue. Nevertheless, despite the silence in both the literature and the archaeological record, e.g. descriptions of different diagnostic features of particular illnesses or accounts of the outcomes of diseases, information about pain in prehistory *is* readily available, quite literally, because in many cases it penetrates to the bone. Skeletal changes are therefore our key to unlocking the narrative of pain in history.

### Skeletal changes and physical pain

In larger osteological assemblages the signs of skeletal changes due to pathologies or trauma are widespread, but the variety of bone changes in life are limited. Simply put, paleopathology is a science that deals primarily with the imbalance between two processes: abnormal bone reduction by osteoclasts or abnormal bone formation by osteoblasts (Ortner 2003:48). Besides the limitation caused by the fact that only trauma or diseases that affect the skeleton are preserved, there is a risk of misinterpretation and an alternative diagnosis should be offered in ambiguous cases. Nevertheless, the skeleton characteristically reacts to universal parameters active during human life, which can be of fundamental value when discussing the concept of pain. Since the skeletons *are* in fact the individuals under study, the osseous material and associated changes must be considered the primary source. Well-preserved teeth offer good opportunities to investigate oral health in past societies. Caries is multi-factorial in origin and have been found in varying frequencies in almost all documented skeletal collections (Figure 1). Aside from dental diseases, the most common skeletal changes are

displayed on the joint surfaces. A combination of factors such as genetics, age, movement, and obesity cause the articular cartilage to break down in a final stage resulting in new bone formation, pitting on the joint surface and eburnation (Ortner 2003). In addition, it is not unusual to explore high frequencies of signs of periostosis (i.e. including changes of both inflammatory and of subperiosteal haemorrhage origin) to varying degrees (Figure 2). These pathologies are of course only minor examples of the different types of abnormalities that may show on bone from the prenatal phase to the death of a human.

If left untreated, pathologies may develop in teeth and bones generating intervals of destructive forces, which make the disease chronic. In most cases a wound must have persisted for a long time before the bone was affected. Using histology studies on a single bone it is possible to investigate repeated outbreaks of an infection (Schultz 2001). To a certain degree these studies make it possible to even explore the time elapsed between the attacks. A trauma is usually a more acute process where a considerable amount of energy has been transmitted to the bone, forced it beyond its limit of plasticity and caused it to break (Figure 3). The bone surface may reveal further information about how the lesion healed. Rounded smooth fracture edges are a sign of repair and recovery, whereas sharp bone ends indicate that the victim did not survive long enough for the healing to show. Irrespective of a chronic or acute cause



Figure 1: Lesion from caries in the lower jaw of a medieval teenager from the Humlegården block, Sigtuna (Id 3365).

the tissue damage shows that the person was exposed to suffering and pain. For example, the abovementioned study by Faccia and Williams (2008) clearly demonstrates that the presence and location of Schmorl's nod (a minor defect of the vertebral body) can be associated with pain. Hence, the osteological record can be used as a direct documentation of pain. The degree and effect of pain experienced is another matter.

#### Skeletal changes and emotional pain

The relation between signs of skeletal change and the burial context is also of value when discussing the consequences of disease or trauma. This subsequent 'pain' is not of physical character but of a more psychological and cognitive nature. For instance, finds of the severely sick and disabled in the skeletal record indicate the level of support of people with less 'economic value' (Roberts and Cox 2003: 39). In a mobile society it is likely that the fitness of a member decided if she or he could survive and it is not too bold to suggest that the severely wounded could sometimes be left behind in groups of hunters and gatherers. In such cases feelings of pain and fear of the person must have been intertwined. In some societies certain diseases could have evoked feelings of disgust making the sufferer an outcast. It has been stated that social roles in medieval society, for example, were defined through bodily appearance



Figure 2: Periosteal new bone formation of a left fibula and tibia from an adult man (the Humlegården block, Sigtuna Id 3093).

and capability (Jonsson 2009:162). In some medieval churchyards the locations of the graves of individuals affected by leprosy, a disease that may fairly easily be identified in a skeleton, suggests the low social status of the afflicted (Arcini 1999; Kjellström 2010). This social stigma most surely has added to the physical pain of the individual. Likewise the guilt or shame that may be associated with a venereal disease such as syphilis, also possible to diagnose in bones, may have increased the pain of the infected. This pain is known as ‘moral pain’ and has been described as “a pain that dominates us, vague and imprecise, but undeniable” (Couceiro-Bueno 2009).

Lack of pain from both physical as well as mental causes should also be considered. A few diseases such as congenital analgesia or nerve damaging syndromes such as leprosy desensitize the afflicted to pain. As a result of this inability to feel, infected wounds may be left untreated, which can progress to sepsis and bone necrosis (Losa et al. 1989). Aside from demonstrating the importance of this sensation, it also highlights the difference between being physically ‘normal’ and ‘abnormal’. To put it bluntly, a normal person experiences pain and an abnormal one does not. However, in a study where people suffering from congenital insensitivity to pain (CIP) were explored to see how they perceived the pain of others, it was clear that empathy is not connected to our physic and personal experience (Danziger et al. 2006). On the



Figure 3: Fractures of a right ulna and radius from an adult man (the Humlegården block, Sigtuna Id 3335). The fracture of the radius is malaligned and the distal part of the ulna is completely destroyed, presumably due to resorption caused by bone necrosis.

other hand, how was a person with CIP or a nerve damaging disease (i.e. someone unable to feel pain) perceived in prehistory? If the ability to experience pain meant being human, was insensitivity a curse or a gift? Although these people were few in number, they were different. Insensitivity to pain could also be a result of a more psycho-chemical character. Clinical studies have shown that stress-induced analgesia may occur in fear of bodily harm due to increased hormonal exudation (Frew 2004). In military settings, an increase of the pain threshold has been observed in groups of soldiers that were investigated (Yamaguchi et al. 2003). This implies that the emotional state and motivation of a fighter in a battle situation is of importance. Furthermore, this could be used as an explanation for the mental strength and control of pain individuals have endured in archaeological contexts with skeletons bearing multiple signs of sharp force trauma (e.g. Kjellström 2004). A variety of examples of trepanned skulls are recorded from different periods throughout the world (Arnott et al. 2003)). Whatever the reason, a person must be highly motivated to control pain, fear and anxiety to agree to this operation.

A possible approach to investigating pain in an osteological context

The possibility of contextualizing pain and the osseous material have been discussed above. The remaining problem is the idiosyncratic nature of pain. Even though this aspect cannot be avoided it may be possible to roughly investigate and compare pain in different skeletal assemblages, at least at a theoretical level. As with analyses involving sociological content, both quantitative and qualitative methods (Neuendorf 2002) may be used, but here drawing upon the osteological record rather than written texts.

A quantitative approach towards the study of pain could be used in ordinary archaeological analyses. The goal in quantitative research is the counting of key categories and measurements (cf. Neuendorf 2002:14). When analyzing skeletal populations it is expected to sort the pathologies and trauma in groups due to causative agent (e.g. congenital diseases, deficiency disease) or affected regions (e.g. joint disorders). The most specific skeletal changes with pathognomonic features of disease could be picked out and associated with clinical data concerning pain for that disorder. Information such as VAS-charts or drug rank orders from modern anaesthetics research in relation to intensive care could be used. The classification should end in a coding scheme where osteological

features are ranked from 'low pain' to 'extreme pain'. For example, a minor sign of arthrosis or gout indicates very different types and levels of pain if modern data are applied. The distribution and frequency of some skeletal changes could then function as a crude measurement of pain in a population and comparisons can be made with other population groups. Note, this is not the same as simply comparing frequencies of similar skeletal change. To achieve a consistent result it is of great importance to only acknowledge skeletal changes that leave clear information about pain at different levels. Furthermore, the pathologies and modern pain research must be combined with demographic data such as sex and age of the affected, as well as general health. This positivistic procedure rests on the assumption that people of all times experience pain in the same way, which may be preposterous to presume following the above discussion about the complexity of this sensation in mind. Nevertheless, not neglecting complicating factors, this procedure could be the starting point for discussions about different levels of pain in prehistoric societies.

In a qualitative approach, analogies with ethnographic sources could be of use together with theories in sociological science concerning e.g. notions about identity and intersectionality. Generally, qualitative research includes methods such as participant observation and in-depth interviews (Mack et al. 2005). Since the victims of pain in this context are silent, it may be of interest to interview informants who personally have experienced the recorded medical or physical disorders both as patients and as professional caregivers. Furthermore, following the guidelines for qualitative research, generalizations should be avoided and each new context treated specifically. This should result in thorough descriptions of people's experience of pain rendering a possible reflection of the phenomenon in the prehistoric sample being investigated. As mentioned above, the archaeological context makes it possible, through the depositional context of human remains in relation to bone pathologies, to discuss the social role of the diseased in the society under investigation. Pain and suffering are not synonymous, i.e. an extreme skeletal change does not always mean severe agony, and different people suffer to varying degrees due to different cultural factors. Hence, the interpretation of the archaeological parameters is, both in detail and in sum, of immense interest to the pain analysis. The proposed dualistic investigation of pain in skeletal assemblages surely will not result in a comprehensive image for any society. The results may,

however, offer a narrative interpretation of suffering at a specific site. Even though no universal ‘truths’ may be reached this approach is both consistent, site specific and potentially informative.

### Some concluding remarks

Bioarchaeologists frequently deal with questions concerning the quality of life. Recording and describing numerous skeletal changes as well as analyzing the remains from infants most often reveal a harsh environment. Is it reasonable to assume a more general acceptance of pain in past societies where people had to adapt to the situation to survive? Experiencing pain is not the same as experiencing a smell. Although unpleasant at first, you can get used to most odours. Chronic pain constantly preys on your health and decreases your tolerance of painful stimuli, and thereby has a profound impact on your quality of life (cf. Frew 2004:57). In a pre-modern environment without an easy and steady access to analgesics, pain was a common factor making it less likely that people complained and whined about minor bruising. It was a part of life. Cultural rules regarding the general tolerance of violence in society, including for instance domestic abuse and torture, also adds to the agenda of how to respond to and publicly display pain. To punish and discourage future offenders, pain could have a very textual function. When an individual revealed the perceived pain to the dependants a shift in identity is implied. The individual went, as a result of the skeletal changes caused by a chronic or acute process, from a strong healthy state to becoming an individual with pain and thereby perhaps even a burden to others. This transition or even metamorphosis need not have been permanent, but surely had an effect on both the individual’s outlook and his or her reputation. This shift could resemble the progressive change in physical strength with age; from being a caregiver to becoming a valetudinarian.

Since pain is a subjective sensory and emotional experience it may not be possible to identify the perceptions of particular individuals in prehistory. As with the other senses, we are left with our contemporary preconceptions. We can only speculate about the type of suffering, fear and anxiety that the lesions observed in bones may have caused. Nevertheless, patterns of disease in the archaeological and osteological records show that pain was a part of everyday life in the past. Despite its complexity, this universal component of human existence should not be neglected.

## Abbreviations

IASP: International Association for the Study of Pain

SHM: Statens historiska museer

## References

- Arcini, C. 1999. *Health and disease in early Lund: osteo-pathologic studies of 3,305 individuals buried in the first cemetery area of Lund 990-1536*. Archaeologica Lundensia VIII. Diss. Lund.
- Arnott, R., Finger, S. and Smith, C. U. M. (eds.). 2003. *Trepanation: history, discovery, theory*. Lisse: Swets & Zeitlinger.
- Assarsson, M. & Persson, J. 2006. *Det gör ont- Musikens betydelse för att lindra kronisk smärta. En litteraturstudie*. Examensarbete i omvårdnad, Malmö högskola.
- Aufderheide, A.C. & Rodriguez-Martin, C. 1998. *The Cambridge Encyclopaedia of Human Paleopathology*. Cambridge: Cambridge University Press.
- Aydede, M. 2009. Is feeling pain the perception of something? *Journal of Philosophy* CVI: 531-567.
- Bengtsson, J. 1988. *Sammanflätningar. Fenomenologi från Husserl till Merleau-Ponty*. Göteborg: Daidalos.
- Brihaye, J., Loew, F. & Pia, H. 1987. *Pain: A Medical and Anthropological Challenge*. New York: Springer-Verlag.
- Buskila, D. & Cohen, H. 2007. Comorbidity of fibromyalgia and psychiatric disorders. *Current Pain and Headache Reports* 11: 333-338.
- Callister, L. C., Khalaf, I., Semenic, S., Kartchner, R. & Vehvilainen-Julkunen, K. 2003. The pain of childbirth: perceptions of culturally diverse women. *Pain Management Nursing* 4: 145-154.
- Carlsson, C-A. and Nachemson, A. 2000. Hur uppstår smärta- ryggsmärtans neurofysiologi. In *Ont i ryggen ont i nacken (vol. 1 & II)*. Statens beredning för medicinsk utvärdering (SBU), Rapportnummer: 145/1, 145/2: 265-290.
- Couceiro-Bueno, J. C. 2009. The Phenomenology of Pain: An Experience of Life. In *Phenomenology and Existentialism in the Twentieth Century*, Tymieniecka, A. T. (ed.), New York: Springer-Verlag, pp. 295-307.
- Danziger, N., Prkachin, K. M. & Willer, J-C. 2006. Is pain the price of empathy? The perception of others' pain in patients with congenital insensitivity to pain. *Brain* 129: 2494-507.
- Deary, V., Chalder, T. & Sharpe, M. 2007. The cognitive behavioural model of medically unexplained symptoms: A theoretical and empirical review. *Clinical Psychology Review* 27: 781-797.

- Dorfer, L., Moser, M., Bahr, F., Spindler, K., Egarter-Vigl E., Giullén S., Dohr G. & Kenner T. 1999. A medical report from the stone age? *The Lancet* 354: 1023-1025.
- Ericsson, A. & Silvennoinen, A. 2006. *Likheter och skillnader hos kvinnor från olika kulturer. en systematisk litteraturstudie*. Examensarbete i omvårdnad, Malmö högskola.
- Faccia, K. & Williams, R. 2008. Schmorl's nodes: Clinical significance and implications for the Bioarchaeological Record. *International Journal of Osteoarchaeology* 18: 28-44.
- Free, M. M. 2002. Cross-cultural conceptions of pain and pain control. *BUMC Proc* 15: 143-145.
- Frew, A. 2004. The influence of discouragement, anxiety and anger on pain: An examination of the role of endogenous opioids. Doctoral Thesis. [Available: <http://www.lib.murdoch.edu.au/adt/browse/view/adt-MIU20050930.111852>]
- Frölich, A. 2009. Traces of steel: killing or healing, based on analyses of the Late Roman Danish cemetery, Varpelev. In *Xantener berichte. Eine Veröffentlichung des Landschaftsverbandes Rheinland LVR-Archäologischer Park Xanten / LVR-RömerMuseum Grabung – Forschung – Präsentation Band 16* herausgegeben von Martin Müller, pp. 67-70.
- Herrman, M. 2006. *Att förstå och förklara smärta*. Högskolan Väst, Forskningsrapport 2006:3.
- IASP [Available: <http://www.iasp-pain.org//AM/Template.cfm?Section=Home>], 2010-04-19
- Johansson, E. 2004. Saga och utsaga om smärta och genus. *Läkartidningen* 47: 3774-3779.
- Johnsson, K. 2009. *Practices for the Living and the Dead : Medieval and Post-Reformation Burials in Scandinavia*. Stockholm Studies in Archaeology 50, Department of Archaeology and Classical Studies, Stockholm University.
- Julius, D & Basbaum, A I. 2001. Molecular mechanisms of nociception. *Nature* 13; 413 (6852): 203-10.
- Jylli, L. 2001. Smärtbedömning och skattning. In *Smärta hos barn och ungdomar*, Olsson, G. L. & Jylli, L. (eds.), Lund: Studentlitteratur.
- Kjellstedt, C. & Grönqvist, S. 2010. *Sjuksköterskans upplevelse av otillräcklig smärtlindring- En fenomenologisk studie*. Malmö högskola, Hälsa och samhälle, C-uppsats.
- Kjellström, A. 2004. A sixteenth-century warrior grave from Uppsala, Sweden: the Battle of Good Friday. *International Journal of Osteoarchaeology* 15: 23-50.
- Kjellström, A. 2010. Possible Cases of Leprosy and Tuberculosis in Medieval Sigtuna, Sweden. Accepted in *International Journal of Osteoarchaeology*.

- Kjellström, A. & Wikström, A. 2008. Osteologi och fältantropologi. In *På väg mot Paradiset – arkeologisk undersökning i kvarteret Humlegården 3 i Sigtuna 2006*. Wikström, A. (ed), Sigtuna: Meddelanden och rapporter från Sigtuna Museum nr 33.
- Kleinman, A. 1988. *Rethinking Psychiatry: From Cultural Category to Personal Experience*. Free Press: New York.
- Kvale, S. 1997. *Den kvalitativa forskningsintervjun*. Lund: Studentlitteratur.
- Lindgren U. & Svensson O. 2007. *Ortopedi*. Liber AB: Stockholm.
- Losa, M., Scheier, H., Rohner, P., Sailer, H., Hayek, J., Giedion, A. & Boltshauser, E. 1989. Long-term course in congenital analgesia. *Schweiz Med Wochenschr* 119: 1303-1308.
- Mack, N., Woodsong, C., MacQueen, K. M., Guest, G. & Namey, E. 2005. *Qualitative Research Methods: A Data Collector's Field Guide*. Family Health International, USA, USAID.
- Napier, J. 1993. *Hands*. Princeton: Princeton University Press.
- Neuendorf K. A. 2002. *The Content Analysis Guidebook*. Sage, Thousand Oaks, CA.
- Oknuki-Tierney, E. 1981. *Illness and Healing Among Sakhalin Ainu*. Vol. 49. Cambridge: Cambridge University Press.
- Ortner, D. J. 2003. *Identification of Pathological Conditions in Human Skeletal Remains*. 2<sup>nd</sup> ed. San Diego: Academic Press.
- Ortner, D. J. & Putschar, W. G. 1981. *Identification of Pathological Conditions in Human Skeletal Remains*. Washington: Smithsonian Institution Press.
- Perl, E. R. 2007. Ideas about pain, a historical view. *NATURE REVIEWS, NEUROSCIENCE* 8: 71-80.
- Pinhasi, R. and Mays, S. 2008. *Advances in Palaeopathology- methodological and biocultural perspectives*. Wiley-Liss, New York.
- Polit, D. F. & Beck, C. T. 2004. *Nursing research: principles and methods*. Philadelphia: Lippincott Williams & Wilkins.
- Qyarsell, R. 2004. Sjukdomar och läkekonst. In *Signums svenska kulturhistoria*, Signum, Lund, pp. 353-378.
- Rejali, D. 2008. Review Essays: "American Torture Debates". *Human Rights Review* 9: 393-400.
- Rey, R. 1995. *The History of Pain*. London: Harvard University Press.
- Richards, J. & Hubbert, A. O. 2007. Experiences of expert nurses in caring for patients with postoperative pain. *Pain Management Nursing* 8: 17-24.

- Roberts, C. & Cox, M. 2003. *Health & Disease in Britain. From Prehistory to the Present Day*. Gloucestershire: Sutton Publishing.
- Roberts, C. & Manchester, K. 1997. *The Archaeology of Disease*. 2<sup>nd</sup> ed. New York: Cornell University Press.
- Schultz, M. 2001. Paleohistopathology of Bone: A New Approach to the Study of Ancient Diseases. *Yearbook of Physical Anthropology* 44: 106–147.
- SHM 18393. <http://mis.historiska.se/mis/sok/bild.asp?uid=256573>  
2010-05-03
- Steinbock, R. T. 1976. *Paleopathological Diagnosis and Interpretation*. Springfield: Charles C. Thomas.
- Svenaeus S. 2003. *Sjukdomens mening: det medicinska mötets fenomenologi och hermeneutik*. Stockholm: NoK.
- Waldron, T. 2009. *Paleopathology*. Cambridge: Cambridge University Press.
- Ward, J. & Linden, R. 2008. *Physiology at a Glance*. Oxford: Blackwell Publishing Ltd.
- Wells, C. 1964. *Bones, bodies and disease*. London: Thames and Hudson.
- White, L. 2004. *Foundations of Nursing: Caring for the Whole Person*. Delmar, Albany, N.Y.: Cengage Learning.
- Yamaguchi, K., Toda, K. & Hayashi, Y. 2003. Effects of stressful training on human pain threshold. *Stress and Health* 19: 9-15(7).