# Summary

Many contemporary scientific studies point to the universal significance of physical attractiveness in the selection of a sexual partner. In addition, physical attractiveness appears as the most constant element in rankings of the most important characteristics in a potential partner. Until recently the academic aspects of attractiveness were chiefly the domain of artists, specialists in aesthetics and psychologists. The question of how canons of attractiveness are formed is still considered to be related to cultural peculiarities or fashion trends and not as a phenomenon with biological foundations. However, the high degree of universality in relation to characteristics considered to be attractive together with the intensive development of evolutionary psychology have led biologists and psychologists to take a serious interest in the subject of human physical attractiveness from the perspective of an evolutionary approach to human behaviours and preferences.

In this book we attempt to analyse why specific characteristics are considered to be attractive both in the opinion of the majority of those evaluating the level of attractiveness of a given person and in some cases in the opinion of the individual concerned (e.g. in relation to perceptions of the attractiveness of a person's odour). Extensive attention is given to factors determining preferences i.e. to the "conditional preferences" (e.g. the age and build of the evaluator, the phases of a female's menstrual cycle, sexual strategies or the subjective evaluation of an individual's own attractiveness) as well as the influence of environmental factors (e.g. access to food resources, socio-economic status, number of potential parasites) on the development of aesthetic preferences in relation to the human body. It should be noted that this study deals with the perception of adult human attractiveness (morphology, voice and odour) exclusively in the context of heterosexual relationships.

Apart from a chapter on the attractiveness of infants, which is not connected with sexual selection, the remainder of the study deals with sexual attractiveness which is strongly linked to the choice of a partner and reproduction. Individual chapters present: a) the research methodology for evaluating the attractiveness of given characteristics, b) the results of research into the attractiveness of defined values of a given characteristic (e.g. body height, BMI and facial symmetry), c) potential biological causes due to which a given characteristic is perceived as attractive, and d) factors determining interpopulational and sometimes interindividual diversity in the percep-

tion of the attractiveness of various values of a given characteristic. Thus this book addresses the problem of the significance of those human characteristics which play an essential role in the evaluation of an individual's attractiveness and which may function as biological cues or signals and therefore be considered in the context of evolutionary biology. There is a common thought running through each chapter: attractiveness is not just the "cover" (by which the "book" should not be judged) - it is something much more important than that. The results of the many scientific studies referred to, together with arguments based on biological theories should be enough to convince most readers of this.

**Chapter 1** presents key biological concepts which constitute the theoretical basis for contemporary studies into human attractiveness and aesthetic preferences. The chapter introduction sets out the main factors determining the development of the mechanism by which partners are chosen (intersexual selection) and the phenomenon of rivalry for partners (intrasexual selection). Of vital importance in these processes are factors such as the amount of energy expended on various aspects of reproduction (e.g. pregnancy, parental care, courtship) and the operational sex ratio. These factors taken together determine which sex competes for the partner (most commonly the male) and which is the object of this competition (most commonly the female). When considering the choice of a sexual partner by a female it is necessary to discover which morphological, physiological and behavioural characteristics may be important for their reproductive success. The characteristics which form the basis for this choice of a partner, known as sexual ornaments, could however be disadvantageous to a given individual in terms of natural selection and in its most extreme form could reduce his/her chances of survival. Later sections of this chapter look at concepts which attempt to explain the evolution of sexual ornaments and the formation of aesthetic preferences. Two main approaches are highlighted. The first of these argues that the choice of a partner may be based on characteristics which do not increase the survival rate of offspring and that therefore the characteristics which are operative in sexual selection do not necessarily have an adaptive value. For example, according to the Fisherian runaway hypothesis, sexual selection may simply be based on arbitrary (in other words having no adaptive significance) preferences of the female in relation to male attractiveness. By contrast the second approach emphasises the ecological adaptiveness of sexual selection. According to this view characteristics perceived as attractive are at the same time indicators of biological fitness and the potential benefits which the female may obtain by choosing a particular male. These benefits are both non-genetic (such as the care which the female and her offspring will receive) as well as genetic (for example genes responsible for a high degree of immunological resistance).

The most recent theoretical models indicate however that these two approaches need not be mutually exclusive. From the perspective of an individual's ultimate reproductive success it is not important if a male's developed sexual ornament is preferred due to the high biological fitness he is able to transmit to succeeding generations or if it is exclusively on the basis of inherited enhanced attractiveness facilitating access to sexual partners. This section of the chapter also discusses the problem of the reliability of biological signalling and the phenomenon known as *lek paradox* whereby

the genetic variability of characteristics which are the object of strong sexual selection does not change.

The penultimate section of the chapter describes the factors determining the evolution of sexual preferences among males and the appearance of what is called *mutual mate choice*. With regard to the development of selection mechanisms among males it is important to note that male preferences relate to those characteristics of females which can have an influence on their reproductive success. Mutual mate choice is rewarded when the fitness of the offspring is dependent on the synergistic parental care of male and female. Due the fact that among humans it is usual for both sexes to bear significant parental investment costs, it is to be expected that *Homo sapiens* will be characterised by mutual mate choice.

The risk to which males are exposed in terms of parental investment in someone else's child, or being bound to an infertile woman leads to male preferences focusing on indicators of female faithfulness, fertility and high reproductive potential. The significance of particular indicators can vary depending on whether the relationship has a long- or short-term character.

The first chapter ends with a summary of the main implications of the approaches taken in studies of human attractiveness arising from evolutionary concepts. Definitions of attractiveness and partner preferences from a biological perspective are also proposed.

**Chapter 2** discusses the significance of the attractiveness of newborn babies and infants. This is the only chapter unrelated to sexual selection and the perception of attractiveness in the context of reproductive behaviours. In the pre-reproductive period of an individual's life the overriding issue is to secure the parental investment necessary for development. In the case of humans this objective is even more important than it is for other mammals. This is because the development of a large human brain is related to very long period of childhood, Children depend on the help and care of adults (chiefly their parents) for a relatively long time in order to survive. The differences that exist in levels of parental investment can be partly explained by various characteristics of the child (e.g. the child's sex, order of birth in relation to other children, or body morphology). Of particular relevance from an evolutionary perspective is the development of characteristics in a child that evoke positive emotions in adults and induce parental behaviours. Varying levels of attractiveness in individual children, and thus varying levels of development of morphological characteristics, the task of which is to attract attention and induce an appropriate reaction from adults, may be related to varying children's biological values.

Trivers (1972) advances the theory that parents, in order to increase their reproductive success, should vary their investment in their offspring depending on the latter's biological fitness and potential reproductive capacity. They should invest more energy, resources, time and care in offspring with a higher biological fitness. Therefore, if attractiveness indicates a child's increased biological fitness, then parents will presumably invest in more physically attractive offspring. Certain genetic diseases or developmental anomalies (e.g. microcephaly, cleft palate) are examples of extreme reductions in child attractiveness, but even relatively minor deviations from the norm,

such as low birth weight or dolichocephaly (having a lengthened skull) significantly modify the perceived attractiveness of a child.

In this chapter a) we describe the morphological characteristics that are key to the physical attractiveness of children (e.g. relatively short limbs and large head, relatively big eyes, round cheeks, protruding high forehead, short face, small nose, mouth and chin, plump body, clumsy movements); b) we analyse factors influencing the perceived attractiveness of children and underline the fact that the perceived level of attractiveness of a child is a fixed characteristic and does not depend on facial expressions; c) we address the question of the relationship between attractiveness and a child's age, and to what degree attractiveness can modify perceptions of a child's age; d) we discuss the biological consequences of the attractiveness of children, which may be related not only to different perceptions but also to different treatment of children of varying levels of physical attractiveness; e) we discuss the extent to which the perception of attractiveness is conditional, in other words whether it depends on a child's gender or the degree of similarity to the adult taking care of the child, or whether it all depends on whether the person evaluating the child's attractiveness is a man or a woman; f) we analyse the significance of a child's attractiveness in the context of his/her chances of adoption; g) we attempt to show that the evolutionarily rooted emotional reaction to the morphological signals from a child is so strong that it is also transferred to other creatures and things which have babyish facial or body features.

The perception of the body proportions and various morphological characteristics of children as attractive enables young children to induce the caring behaviour in adults that they so much need. As ontogenetic development occurs the body takes on proportions characteristic of adults and ceases to function as a magnet drawing out affection and care. We present data indicating that the physical attractiveness of children influences the judgment of adults concerning their age. Less attractive children are perceived of as older than their more attractive peers. The result of this is that adult expectations in relation to children of varying levels of attractiveness (or having varying degrees of neotenic characteristics) are different. Because more attractive, and thus seemingly younger, children are not expected to have developed competencies, they are generally more favourably evaluated and treated in comparison with less attractive children.

Research into the influence of the attractiveness of children on the behaviour of mothers has shown that attractiveness (mainly however in boys) is related to the amount and quality of parental care that children receive in the early stages of their lives. The mothers of attractive infants are more likely to engage in affectionate play with their children and devote more time to them in comparison with the mothers of less attractive children. Of course these differences in the behaviour of mothers are most commonly unconscious.

At the end of chapter 2 we analyse positive adult reactions to childlike characteristics observed in very young animals (e.g. in kittens and puppies). It is most probable that a particular affection for those traits resulted in the selection of breeds which throughout their lives maintain body proportions characteristic of young animals. The influence of evolutionarily rooted reactions to neotenic characteristics is so large that it is even reflected in toy design. The evolution of the shape of the teddy bear (or Mickey

Mouse) is an example of a cultural feature which is influenced by genetically conditioned human preferences. Thus the end result of this evolution is a teddy bear with childlike characteristics.

The significance of attractiveness in children undoubtedly shows that visual attractants have a broader function than merely reproductive, although it has to be said that it is no easy task to prove the influence of a child's attractiveness on parental investment. This interrelation would be easier to demonstrate if parents had many children and limited resources.

**Chapter 3** deals with the height of the body and its length proportions as morphological characteristics which are one of the most important criteria in evaluating human attractiveness. Because body height taken alone is far more significant for evaluating the level of male rather than female attractiveness, most of this chapter is devoted to biological factors determining the attractiveness of this characteristic in men.

The first section of this chapter presents the diversity of average body height in various populations of *Homo sapiens* and the biological factors behind these differences. The results of studies of the attractiveness of men with different body heights conducted using various methods are then presented. Questionnaire-based research, analysis of singles ads, studies conducted at speed dating sessions, data concerning the number of sexual partners had by a given individual, the level of attractiveness of the female partner, and the probability of the partners forming a long-term relationship (e.g. marriage), all point to the greater attractiveness of relatively tall men (above average body height in a given population), but not those who are very tall (thus the interrelation of attractiveness and male height is not linear). These findings are confirmed by research into preferences concerning the size of the sexual dimorphism between partners. Admittedly the body height of a given female is a key factor, but the research shows that females almost always prefer men who are at least 4% taller than the female. The higher incidence of couples where the man is taller than the woman, than would occur on the basis of random pairing, points to the activity of sexual selection in relation to body height (at least in western societies). It should however be underlined that the evidence indicates that the body height of the male is most important at the first encounter and in the context of initiating sexual relations, so that it functions as a trigger or so-called *prime mover* facilitating the formation of the relationship itself between the partners. In the next section of chapter 3 the influence of body height on the attractiveness of females is discussed. Some studies indicate that if a female's body height is within the normal range for a given population it has no effect on how her attractiveness is perceived whereas others conclude that women of average body height are most attractive. Thus there is either no correlation between female body height and attractiveness or it can be represented in the shape of an inverted U. The fundamentally larger range of body height which has no effect on perceptions of female attractiveness can be explained from an evolutionary perspective by the fact that men have no reason judge the attractiveness of women on the basis of characteristics which are very tenuous indicators of female age or fertility.

The next substantial section of this chapter is devoted to analysing the causes of aesthetic preferences in relation to various body heights and proposing hypotheses to

explain the attractiveness of relatively tall men. A series of biologically relevant potential causes for preferences relating to suitable body height are considered: a) intrasexual physical rivalry; b) signalling of "good genes" responsible for e.g. high immunological resistance or connected with a high degree of masculinisation; c) signalling of optimal conditions for development and high future health potential; d) signalling of the ability to gain high social status (e.g. due to higher intelligence), and thus effectiveness in obtaining resources; e) the positive correlation between male body height and some other trait which females find highly desirable in a partner. Some of the reasons for the attractiveness of male body height might be related to genetic and others to non-genetic benefits which a woman may gain from a partner. Body height as a cue of a man's socioeconomic status is discussed in particular detail, and three hypotheses connected to this subject are evaluated: 1) **the pleiotropic genes hypothesis**, which argues that the same genes which are responsible for body height, also influence certain personality traits or intelligence which in turn facilitate social advancement; 2) **the trump card hypothesis**, according to which tallness is socially very positively perceived, and this leads to greater self-confidence and assertiveness in tall men, which in turn facilitate upward social mobility; 3) **the third factor hypothesis**, which postulates the existence of an immeasurable social factor (e.g. the quality of parental investment) as a result of which the correlation between level of education and body height is merely the side-effect of a hard-to-pinpoint environmental factor. Taking into account the various correlates of body height and the postulated biological cues associated with this characteristic, the most probable models for the causes of the attractiveness of tall men are proposed.

Chapter 3 also presents data from various populations concerning the interrelation between male body height and reproductive success. It is shown that if, as is argued, such an interrelation exists, then taller men have more children or a larger chance of having at least one child. Research also clearly demonstrates that this results from the greater attractiveness of tall men which increases their chance of gaining a female partner, and not from their greater physiological fertility.

A further section of the chapter discusses female body height as a signal of biological fitness. The preferred body height for women is the populational average and, as research data shows, women of this body height generally achieve higher reproductive success than others. Data is also presented to show that environmental conditions (e.g. risk of starvation) exercise a significant influence on aesthetic preferences in relation to female body height and on reproductive success. Generally however the body height of females has far less significance than that of males in the context of perceptions of attractiveness.

The last section of this chapter looks at the relative significance of leg length in the context of perceptions of attractiveness and the biological reasons why individuals with somewhat longer legs in relation to body height are considered to be more attractive than those with the average or lower than average value for this characteristic in the population.

**Chapter 4** discusses the attractiveness and biological meaning of characteristics such as: a) body mass index (BMI), b) female body shape connected with the distribution of fat tissue which is chiefly expressed in terms of the waist-to-hip ratio (WHR), c) male

body shape not only described in terms of WHR, but also e.g. by the shoulder-to-hip ratio (SHR), d) the body's level of fluctuating asymmetry (FA), and e) female breast size. This chapter is the longest in the book due to the large number of studies referred to, the numerous evolutionary hypotheses explaining aesthetic preferences in relation to the characteristics discussed in the chapter, and the various environmental factors affecting these preferences in different populations.

Perceptions of the physical attractiveness of others based on their BMI probably vary more both between cultures as well as within the bounds of one culture in different historical periods than perceptions based on any of the ontogenetic morphological characteristics discussed in this book. This does not mean however that aesthetic preferences with regard to BMI are devoid of biological determinants. This argument is supported by the fact that excessively low BMI is not considered the most attractive trait in any culture and that due to the large influence of environmental factors (access to food) on this characteristic, it will convey rather different information about the health or fertility of a woman in different ecological conditions. In the first part of this chapter we draw attention to the fundamental difference in the significance of BMI in women and men. Female BMI has a much larger significance as a signal providing information concerning reproductive potential, fertility or the energy resources available for use during pregnancy and lactation. The second part of this chapter discusses the results of research into the attractiveness of the human figure in terms of WHR, the formation of this preference during ontogenetic development, the biological significance of the practically universal preference for a low WHR (around 0.7) in women (signalling reproductive potential and the level of steroidal hormones and thus fertility) and hypotheses for the development of low WHR in women during human evolution. This chapter also deals with controversies on the relative significance of BMI and WHR for female attractiveness. The next section of the chapter presents the results of research into the attractiveness of the male body in terms of build (musculature, the relative width of the shoulders, chest and hips), the influence of these characteristics on male sexual strategies, and the evolutionary causes for diverse preferences in relation to male build. Another important factor in evaluating levels of attractiveness in both sexes discussed in this chapter is body symmetry (including breast symmetry in women) as measured by the level of fluctuating asymmetry (FA). Because the level of body symmetry seems to be positively correlated with the health of an individual (research findings are not however definitive in this regard), we may postulate that aesthetic preferences in relation to a high degree of body symmetry are adaptive.

The last section of this chapter deals with the important sexually dimorphic characteristic of female breasts. The biological meaning of the attractiveness of breasts in terms of their size is discussed along with hypotheses for the appearance of fatty mammary glands in human evolution.

**Chapter 5** deals with the biological meaning of face attractiveness. The face is the part of the body which probably makes the largest contribution to the overall perception of a person's attractiveness. The facial area most quickly draws the attention of those evaluating and it takes only a split second to judge the attractiveness of someone's face. In addition, research shows that there is a high degree of agreement both

between and within cultures as to what constitutes attractiveness in this part of the body. The chapter starts with a description of the methodology used and the results of numerous studies of the main morphological parameters of the face influencing its attractiveness. Among the most intensively studied male and female facial characteristics linked to attractiveness we can include the anthropometric averageness of facial traits, symmetry, and the hormonally determined degree of facial sexual dimorphism (i.e. the feminisation of women's faces and the masculinisation of men's faces). Subsequent sections describe the probable biological significance of particular characteristics and how they affect aesthetic preferences and perceptions of attractiveness in relation to male and female faces.

This chapter contains only a relatively short treatment of the biological significance of facial skin since this is discussed in detail in chapter 6. Developments in computer technology have enabled this subject to be researched with increasing thoroughness and findings point to skin colour and texture playing an important role in the formation of male and female aesthetic preferences. Because various skin parameters may be indicators of age, health, or hormonal profile it is possible that these preferences have a biological basis.

The next section of the chapter discusses the results of research into the link between an individual's genetic make-up (in particular heterozygosity of the major histocompatibility complex) and the attractiveness of her/his face. Although many studies point to the possibility that aesthetic preferences developed according to a mechanism of selecting "good genes", it should be noted that some findings are still not definitive and many conclusions are controversial.

The final part of this chapter deals with the development of individual differences in perceptions of facial attractiveness and the conditionality of aesthetic preferences. Factors such as menstrual cycle phase, sexual strategies adopted by potential partners, a woman's self-assessment of her own attractiveness, and her degree of identification with gender stereotypes can have a significant impact on how a woman perceives the attractiveness of men's faces.

In addition, male and female aesthetic preferences can be affected by the facial appearance of the parent of the opposite sex. Research also indicates that women may copy the partner choices of their peers and be heavily influenced by peer opinion in forming their own aesthetic preferences. It is however characteristic that such individual variability in the perception of facial attractiveness may also have biological roots and adaptive significance.

**Chapter 6** deals with the attractiveness of pigmentation (skin, hair and eyes) and human body hair and the biological significance of this attractiveness. The first section of the chapter discusses the results of research into people's preferences concerning body pigmentation in the context of ethnic comparisons and in homogeneous populations. Most studies indicate that in general men prefer women with a lighter complexion, and women prefer men with a darker complexion. These preferences can be explained in the context of the findings of research into sexual dimorphism in the area of skin colour (in most populations studied, women have lighter skin than men), and the role of skin colour in signalling female fertility and reproductive potential. Apart from

research into the attractiveness of skin colour, it has been demonstrated that various kinds of facial discolouration or unevenness in facial colour are perceived to be unaesthetic. These may be indicators of an individual's health or even age.

The next subject addressed in this chapter is that of how hair colour influences human physical attractiveness. Although there is not a high degree of agreement in this area, a small majority of studies point to the attractiveness of fair hair in females. This may be connected with fair hair being a signal of youth. Discussion of the influence of eye colour on human attractiveness is restricted to just a few studies. On the basis of the results of these studies it appears that partners with similar eye colour form pairs more often than would occur on a random basis. This phenomenon is especially marked in pairs where the male has blue eyes. It is possible that this phenomenon is linked to the importance that men attach to being "certain of paternity" (all the children of blue-eyed parents have blue eyes).

The next section describes the current state of knowledge concerning male and female hairstyles, and also male facial and body hair. There is a large degree of agreement that longer hair in females is perceived as more attractive than shorter. In addition men evaluate women with long hair as being healthier and more feminine. These results are obvious in the context of the studies discussed in this chapter which show a link between hair quality and health. By contrast, male hairstyles and body hair do not, it would seem, have such an important influence on perceptions of male attractiveness (although it has been found that baldness significantly reduces the physical attractiveness of men). The results of studies into the influence of male facial hair on attractiveness are ambiguous and most probably they are strongly dependent on a number of ecological and cultural factors. A few explanations of this phenomenon are offered here including a hypothesis according to which facial hair – most likely a signal of masculinity, domination and aggressiveness – is significantly more adaptive (and therefore perceived as attractive) at times of increased male rivalry.

The chapter conclusion draws attention to the fact that the research results discussed have certain limitations. Relatively few studies are available and these were conducted primarily in Western societies, which makes it difficult to draw universal conclusions concerning preferences, particularly relating to the attractiveness of pigmentation (skin, hair and eyes) which is strongly subject to the pressure of natural selection. In addition general agreement concerning perceptions of attractiveness of specific phenotypic characteristics described in this work does not exclude interpersonal diversity in the evaluation of attractiveness. This is why we have also discussed certain conditional factors (e.g. positive assortative mating, the influence of the morphological characteristics of parents on the preferences of their offspring etc.) which affect perceptions of the attractiveness of various physical characteristics in a potential sexual partner.

**Chapter 7** analyses the influence of various acoustic parameters of the human voice on perceptions of attractiveness, the attribution of morphological characteristics on the basis of the voice and the biological determinants of aesthetic preferences in relation to the voice. The chapter also addresses the still poorly researched subject of the attractiveness of laughter and its significance as a signal.

The structure of the voice organ is described at the beginning of the chapter along with the mechanism of voice production and the acoustic parameters of the human voice. The influence of sex hormones on the female and male voice is then considered together with the findings of research into the formation of the voice in ontogenetic development.

Due to the difference between this characteristic and morphological characteristics, the methodology of research into the attractiveness of voice and laughter is discussed in detail.

Sexual dimorphism in the human voice (men have on average much deeper voices than women), indicates that this characteristic is relevant when evaluating the attractiveness of a potential partner. Research findings confirm this: relatively high female and relatively low male voices are perceived to be more attractive. Factors affecting the voice are also considered e.g. hormonal levels or the phases in the menstrual cycle. The chapter also discusses the attribution of certain personality traits (e.g. dominance) or morphological characteristics (e.g. height or body mass) mainly by reference to the most frequently studied acoustic parameters (e.g. fundamental frequency) of the human voice. Research is also presented on the subject of the connection between the attractiveness of the voice and the age of sexual initiation, the number of sexual partners and episodes of unfaithfulness. The chapter also discusses hypotheses for the evolutionary origins of gender distinctions in the human voice and the type of selection operative. At the end of the chapter the subject of laughter is discussed from the point of view of its evolutionary origins and the first studies are presented (there are still very few) into perceptions of the attractiveness of laughter depending on its acoustic parameters.

**Chapter 8** considers the contribution of odour to human attractiveness. In contrast to the other characteristics discussed in this book, the perception of the attractiveness of odour has a very specific character, and because it appears to be linked to genetic sexual compatibility it is characterised by large interpersonal differences. The chapter starts with a description of areas of the body where odours are produced and the physiological aspects of the reception of information concerning their chemical character (this includes both conscious reception and unconscious, e.g. pheromones). In the section dealing with the physiological basis of human body odour particular emphasis is placed on the evolutionary significance of the human odour-producing "axillary organ" and on controversies surrounding pheromone signalling in humans. After a description of the methodology for investigating the attractiveness of human body odour, its biological significance is discussed in such contexts as hygiene and health (including infectious and parasitic diseases), age, degree of body symmetry, hormonal profile, female fertility, and heterozygotic matching of partners. The last mentioned area relates to the perception of odours from individuals with a differing major histocompatibility complex (MHC) as being more attractive, which is an indicator that the offspring from such a union will have a higher level of heterozygosity and thus will have increased biological fitness.

The next section of this chapter presents the results of research into the attractiveness of male odour and the biological significance of these preferences. Various

conditional preferences with regard to body odour are also discussed e.g. early life experiences and the olfactory associations connected with them, sexual orientation and changes in the perception of female odour depending on phases of the menstrual cycle.

In the final section of this chapter the question of perfume choice in relation to an individual's own odour is discussed as well as the interaction of perfume with the natural odour of a female and the interrelation between olfactory attractiveness and an individual's other characteristics e.g. morphological. Although, as is frequently emphasised in this chapter, chemical signalling has a much greater significance for human sexual attractiveness than was thought up to quite recently, many issues and hypotheses still require detailed investigation, e.g. intercultural differences and the effects of early childhood imprinting on olfactory preferences. In addition, the significance of human pheromones remains controversial as does the functionality of the human vomero-nasal organ (VNO) in receiving pheromone signals.

**The last chapter** mainly discusses the following: a. hypotheses explaining the potential evolutionary causes for the multimodal signalling of biological fitness by means of various characteristics considered to be physically attractive. This question is related to correlations between various characteristics that are taken into account when evaluating attractiveness (e.g. odour or voice and facial attractiveness or body symmetry). b. The "bad genes" hypothesis according to which the cognitive mechanism formed by evolution which is responsible for evaluating attractiveness has the primary function of enabling individuals to avoid pairing with those having "bad" or "unfit" genes. This hypothesis explains why we do not always observe (especially when the value of a characteristic under evaluation is average to very attractive) a linear interrelation between the attractiveness of a given characteristic and the biological fitness of the individual. Attributing better health or higher intelligence to an individual on the basis of e.g. his/her above-average level of facial attractiveness may be the result of the overgeneralization that people make, in other words they extrapolate from signals connected with morphological facial anomalies to diverse values of facial characteristics in individuals of a good phenotype.

This chapter also presents evolutionary factors which should be taken into account when interpreting the results of research into the relationship between attractiveness and biological fitness. For example, it should not be forgotten that aesthetic preferences in relation to various characteristics could have evolved in ecological conditions different from those in which many human societies live today. We must also remember that the intensity and type of natural and sexual selection may have differed in different periods of human evolution. The final question dealt with concerns the use of various "artificial beautifiers" (e.g. highlighting the redness of the lips), or changing BMI or WHR using liposuction, which usually confirm the significance of specific values of various physical characteristics for human attractiveness described in the rest of the book.