Adolescence in the Pacific
A BIOSOCIAL VIEW
Carol M. Worthman

This essay attempts to frame the largely ethnographic chapters of this volume with a wider developmental perspective by bringing together two anthropological literatures on human development, one that deals with physical variation and another that documents cultural diversity. As in other regions of the world, both kinds of diversity are marked among Pacific peoples. The timing and course of human development—puberty in particular—vary widely within and between populations. Even more disparate are the ways in which societies have constructed the period between childhood and adulthood, known in Western societies as adolescence. Interactions between these two levels of variation will be examined, and two conclusions drawn: first, that human development is inherently biosocial, and, second, that systems of child rearing and socialization rely on the dialectic of body and context that shapes ontogeny. This dialectic is seldom apparent to social actors, who instead see development as a social process sustained by cultural interpretations. This widely held conviction has even convinced many ethnographers that social arrangements largely determine what a child will become.

One strong thread of evidence gives immediate pause to the “Xerox model” of socialization, in which the blank page of the child is put through the copy machine of socialization and turns out like others exposed to the same cultural template. People turn out quite different from one another. Substantial individual variation among adults—in behavior, appearance, and life history—both reflects inherent individual differences and reveals the stochastic nature of development, arising as it does from continuous encounters over time between inherent features, organized social intervention, historical accident, and contextual vicissitudes. Development and socialization as normative outcomes are at best probab-
probabilistic. As the developmental psychologist Richard Lerner has observed: "In probabilistic, as opposed to predetermined, epigenetic models of development, biological and contextual factors are seen to be reciprocally (dynamically) interactive, making developmental changes dependent upon the timing of interacting biological, psychological, and social factors" (Lerner 1987). Epigenesis is the interaction of context with genotype that is responsible for shaping the phenotype, or characteristics of the individual. Through this term, developmental biologists tacitly concede the importance of context—that, indeed, organisms (particularly humans) are biologically designed to develop in interaction with their environments. In other words, biology depends on social context in its development while society depends on biology in shaping persons. The two are mutually defining domains of ontogeny.

At present, anthropologists separate biological from cultural domains and consider human development from two quite disconnected vantage points: The first is contemporary cultural anthropologist’s concern with the social construction and local constitution of selves. The second is physical anthropology’s work on growth and maturation as a window onto human adaptation. Such a division of labor fosters concepts of development that implicitly divide persons into two constitutive domains: social constitution and physical constitution. How these domains relate in the construction of (if one prefers a less deterministic term) ontogeny of persons remains poorly articulated (LeVine 1990). Recognizing this lacuna, psychologists have lately emphasized that development is a reciprocal process that occurs through time between the individual and the environment (Lerner and Fech 1987; Sartori and Magnusson 1990). The temporal dimension is important because development is a process of differentiation; maturation is directional and cumulative in the sense that a young person, once at point B, cannot return to point A, although state B remains a product of prior events and states.

Both historical/social conceptions and anthropological analyses of adolescence express tensions between viewing adolescents as in a state of being or of becoming. On the one side, the context and experience of this life stage can be taken phenomenologically as lived personal history; on the other, it can be construed in terms of the adult outcome toward which it leads. Adolescents are frequently seen as not quite being "themselves"; rather, they are seen as being either in a special state or in transit to some ultimate maturationally determined destination. Pacific societies represent divergent views on what adolescence is "about," from those that foreground being adolescent to those that emphasize becoming adult. Focusing in the present volume on adolescent and their socially constructed lived experiences around the Pacific reveals a rich social diversity that can aid our thinking about how socialization works.

Many folk developmental theories treat maturation either as something that
happens "naturally" — an unfolding with little intervention — or as a process this culture must undertake with strong, obvious, sustained effort. Both views have merit, but where a culture falls on this spectrum shapes the ecology of child development. I will demonstrate that the cultural milieu constructs not just the social but also the physical life history of the individual. I will also show how, reciprocally, the biology of maturation influences cultural concepts, practices, and interpretations of development. As necessary background to this analysis, the biology of puberty will first be reviewed. Then, drawing on examples of peoples around the Pacific, I will examine how social processes depend on and act through the biological domain in ways that are clearly articulated at times or more often, hidden. This latter observation will lead to a consideration of effects of social change on continuity that may also be mediated by alteration of biosocial interactions in development.

PUBERTY AND ADOLESCENCE

The dual constitution of adolescence in scientific discourse is expressed in the terms puberty and adolescence. Continued over time, their difference reflects the divided scientific approaches for studying human development. Adolescence is a social construct that varies enormously; but puberty is a universal physiological process. Puberty is the sequence of physical changes that transform the child into an adult, most visible by attainment of reproductive maturity, adult size and shape. Thus, puberty is universally experienced as a period of growth while adolescence is not. Onset of puberty is defined by the first rise in gonadotropic hormones secreted by the brain which initiate the process or by the first bodily changes of puberty, which are breast buds in girls and genital growth in boys. Puberty ends when this physiological sequence of maturation changes is complete. Adolescence, on the other hand, is defined by the culturally constituted meanings of these changes, especially the childhood-to-adulthood transition. The beginning, ending, and duration — not to mention context — of adolescence differ greatly across societies. Moreover, the chronological relationship between puberty and adolescence varies widely. The Pacific peoples discussed in this book illustrate the breadth of such diversity: some do not recognize an adolescent period at all while others elaborate and prolong it. Australian Aboriginal peoples, for instance, traditionally married girls at the onset of puberty (Burkhart 1988:225–6, and chapter 7, this volume). Tanim-Rikasim boys, on the other hand, undergo a ten-year ritual cycle to attain manhood (Poole 1986). Gender differences in social construction of adolescence are often quite pronounced: among the Tiwi, girls were married before puberty, but boys endured a 10-year initiation cycle before they could do so (Hart, Piligok, and Goodale 1986:303–4).
Even within groups, then, adolescence can be construed differently, with distinctive grades, steps, and meanings.

Does such marked cultural variation correspond to differences in the kinds of persons that members of these societies are expected to become? The interface between puberty and adolescence—biological and social processes—provides an opportunity to examine interactions between the shared biological processes of ontogeny and the particular meanings of the construction of persons and groups. We may, for instance, expect societal differences in sex roles to be reflected by consistent variation in socialization practices (Whiting and Edwards 1966).

Patterns of physical maturation have been closely studied in Western populations, so that extensive data on endocrine and morphologic changes of puberty in both sexes are available and give a fairly complete picture of the biology of this stage. Unfortunately, equivalent data for any Pacific Island group are lacking. However, comparative studies have shown that the process of puberty is roughly equivalent across populations, so that we can use data from Western groups to form a representative picture of pubertal events and their general sequence. Figure 1 outlines the progression of key physical changes of puberty in well-described Western populations, emphasizing visible alterations in growth, shape, and function, along with the occasional endocrine patterns that cause them. The timing of events varies widely across societies, though, competing with attempts to represent the course of puberty. Therefore, figure 1 has been constructed to show the schedule of pubertal change in a particular population at a particular time, namely, a Western postindustrial setting with low child mortality and morbidity along with good nutrition. The figure is a composite, constructed from data on European and American populations to represent a group having a median age at menarche of 13.4 years, the age reported for a large British cohort born in the 1920s and a major source of data on pubertal progressions (Marshall and Tanner 1969). Where data are from an American population with a slightly different timing of menarche, ages of reported events have been adjusted slightly to maintain the chronological relationship to median age at menarche.

Puberty is marked by physical growth, morphologic change, and the endocrine changes that drive both of these. Alterations in pattern and amount of hormones stimulate the gonads by the brain (via release of the gonadotropins, LH and FSH) induce increases in gonadal activity that stimulate rises in estradiol and testosterone production (Grumbach et al. 1966). Genital growth in boys and breast development in girls ensue. The combination of gonadal and central nervous systems acutely drives reproductive maturation and the appearance of primary and secondary sex characters. These features include penile and testicular growth, muscle expansion, voice change, and facial and axillary hair
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### SEX CHARACTERISTICS

- **Pubertal stages**
  - peak height velocity
  - peak muscle growth
  - peak growth spurt

### ENDOCRINE CHANGE

- LH, FSH
  - luteinizing hormone
  - follicular phase
  - luteal phase

### FEMALES

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### SEX CHARACTERISTICS

- pubertal stages
  - peak height velocity
  - peak muscle growth

### ENDOCRINE CHANGE

- LH, FSH
  - estradiol surge

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Fig. 1. The course of puberty in males, including endocrine changes and the morphological features associated with them. Sources: After 1950: Clugston et al. 1976; G. B. Pontes 1956; Kulin et al. 1959; Laron et al. 1980; Lees and Pigott 1975; Lee et al. 1975a; Lee 1985; Mulholland 1982; Marshall and Tanner 1969, 1973, 1986; Nothelfer et al. 1987.

In boys, and breast development and altered pattern and distribution of fat in girls. Growth markers depicted in figure 1 comprise median time of peak height velocity (PHV), or maximal height gain per unit time peak rates of growth in muscle bulk and strength in boys, and age at peak rate of fat gain in girls. Figure 1 also depicts median ages of developmental events such as firm appearance of axillary (armpit) hair, first emission of menstrual liquid in females, and on. Horizontal lines in figure 1 refer to gradual or
cumulative changes over time, with numbers marking conventional stages of adolescent development. Divisions between numbers mark median age of entry into each stage. Morphological onset of puberty is defined as the appearance of stage 2, or the age at which change first occurs in either of the defining morphological features of puberty (pubic hair growth or pubic hair growth in boys, breast development or pubic hair growth in girls). For boys, the period of growth in length of the penis is also indicated by a solid line. For both sexes, median age at first significant daytime rise in gonadotropins (FSH, LH) and gonadal steroids (testosterone, estradiol) is noted as well. Characteristic developmental shifts in adrenal androgen output commence in mid-childhood with a slight increase in slope with age (adrenarche) and increase linearly across puberty after another pronounced rise in slope in early puberty. This pubertal period of increased rate is indicated by the straight line. Such changes in output of adrenal androgens play a significant, but poorly understood, role in puberty. They stimulate pubic hair development and act synergistically with gonadal steroids to produce accelerated growth and skeletal maturation, and, in girls, to induce the appearance of axillary hair. In the case of boys, axillary hair growth is governed largely by levels of testosterone, a very potent androgen that increases with testicular development.

When asked to compare development in both sexes, people from most societies, including our own, will say that boys reach puberty and mature much later than girls. Based on endocrine change and pubertal staging, however, boys in Western postindustrial settings enter puberty just six to eight months sooner than do girls (see fig. 2). Girls, however, progress more quickly through puberty and display outward signs of maturity earlier on in the process than do their male peers. Peak height velocity in girls occurs about a year after they become pubescent and almost 1.5 years before menarche, while in boys it transpires nearly 2.5 years after entering puberty, about one-half year after sperm production commences. Thus girls grow faster shortly after onset of puberty and well before reproductive function is achieved, but boys have their most rapid height gain much later in puberty, after they attain reproductive capacity.

Sexual dimorphism in puberty is due in part to differences in gonadal hormone production that have differential effects on steroid target tissues (Schreiber and Baren 1984). Girls' breasts and growth rate are highly responsive to estradiol production; consequently, stimulation occurs early in the course of slow pubertal increases in ovarian activity. Boys, on the other hand, show very large and rapid rises in testosterone over two years, with maximal increases occurring in individuals over a period of only ten to twelve months. Boys apparently require substantial testosterone stimulation to achieve the most visible pubertal changes—accelerated growth, muscle building, voice change, and facial hair. In contradistinction to sex differences in visible attainment, capacity to
produce gametes (indicated by menarche and first ejaculation) is achieved almost simultaneously by both sexes. Despite near equivalence in timing of basic reproductive competence, boys and girls appear to mature at quite distinctive rates because of gender differences in the timing of other signs of maturity. Each sex exhibits some dissociation of reproductive maturity from overall physical development, with girls appearing more precocious and boys more juvenile than their actual state of reproductive maturity.

The pubertal transformations, which are charted in Figure 1, occur in a social context; they alter adolescents' views of themselves and perceptions of them by others. Reviewing the visible changes of puberty with this point in mind reveals sources for cultural models of development. We have just seen how, in the face of relative gender synchrony in reproductive development, boys and girls are believed to mature at different times. Basson (1990) reports a Brazil saying that deftly captures that perception: "Women take a short cut, men go around." While girls show early signs of maturity in growth and breast development, the signs of androgenization in males are more numerous, being expressed as several new traits—new physique (muscle gain, relative fat loss), many voice, adult genitilia, and whiskers. Girls' genitalia, by contrast, are not transformed in puberty, although their body fatness is altered through breast development and, later, fat gain. The plethora of changes over a prolonged period in boys supports the cultural view of maturation as a more incremental, achieved status in males than in females. One physical change which has not been discussed in the anthropological literature on adolescence is gynecomastia. In Western populations, as much as 70 percent of boys show breast enlargement in early to mid puberty (Brunette 1996; Syte 1991). This condition frequently causes consternation for the boy and his parents, though the condition subsequently regresses within a short time. One wonders whether gynecomastia is also prevalent in nonwestern groups, and how it is viewed by them. The fact that an early sign of puberty in some boys is breast expansion, something usually identified only with females, should excite attention in societies with strong gender polarization, including several of the New Guinean groups discussed in this book.

Gaps in different developmental milestones during puberty also create windows for perceived efficacy of social action. Many groups observe menarcheal seduction and some even deliberately fasten postmenarcheal girls in Western societies, where such practices are absent, girls show most rapid gain in fat two years after peak height velocity, or in the year after menarche. Rituals at menarche and practices aimed at identifying girls with adult female roles after menarche are reinforced by the propensity of postmenarcheal girls to gain weight and achieve an adult feminine body habitus girls appear to become more like women as the result of social interventions. In boys, there is a curious lag of about 1.5 years between the time that they acquire muscle mass most rapidly, at
peak height velocity and the time when most accelerated gains in strength are realized. The physiologic reasons for the temporal gap are unclear, but such a gap can reinforce the culturally constituted perception that it is one thing to have male physical attributes, and quite another to have a man's stature (Mead 1928, 1938). Practices aimed at "making men" out of boys receive validation from the observation that boys gain muscle but do not become strong as men until after culture has intervened. Thus, belief in nurture can be reinforced by nature.

The wet-dry, soft-hard metaphors for gender frequently encountered in New Guinea provide a further instance of biological discontinuities in metaphors of ontogeny. Viewed through this metaphor, men are "dry," but boys are barren and nurtured by women and are "wet" by association. The purpose of ritual cycles commencing in infancy to late childhood is in part to purge boys of their "wetness" through diet, bloodletting, masculinize work, and trials of physical endurance (stress, sweating, denial of water). The biology of puberty supports this cultural model. Adults exhibit marked gender differences in proportion of body fat and muscle, so that the more muscular men appear hard, or "dry," compared to women. A slight sex difference in percentage of body fat exists in Western children: girls having more than boys, but the difference increases sharply from early puberty (when both sexes gain fat) onward. As boys' growth rate increases, proportionate body fat is reduced, and they appear leaner, at peak height velocity, with increments in muscle mass, they become leaner still. Body density therefore increases relatively to water (fat having less and muscle greater density than does water) during puberty in boys; they do dry out, so to speak. (G. B. Forbes 1916; Malkin 1966; Marshall and Tanner 1969).

Many maturation sex differences can be readily discerned by an observer; others are relatively invisible, being purely physiologic. The gender-differentiated manner in which physiologic changes of puberty are manifested by the body or in behavior also can be seen as selecting adaptive strategies, for these maturation-related changes can act as signals to other members of society who "read" them and adjust their expectations and treatment of the adolescent according to the cultural schema for development and scripts for socialization (Worthman 1987). Breast development is frequently interpreted as a significant maturation-related sign. Many groups represented in this volume, Australian Aboriginal, Gebusi, Paita, and Venetian societies are known to use breast bud formation as a basis for assigning adolescent status to girls. The evidence clearly indicates that girls' appearance at puberty allows the attribution of maturity before reproductive competence is achieved, while that of boys forestalls attribution of maturity and assumption of adult roles until well after reproductive competence is reached.

The developmental profile shown in figure 3 may be representative on the population level, but it conceals a phenomenologically important fact: individuals in any population vary widely in timing of maturation changes. Because
Western societies place children in age-graded school classes. They are acutely aware of this situation: scanning any junior high school class reinforces the impression of developmental diversity by age. Both in Western (Marshall and Tanner 1969, 1970) and nonwestern (Worthman 1986) groups, there are ages at which one can find same-age peers who have not entered puberty and those who have already completed it, along with the entire spectrum of attainments in between. Socialization practices that are organized by chronological age, such as schooling, are therefore targeting developmentally diverse groups, whereas those organized by maturation status will obviously target more homogenous ones. The schooling system handles the issue of individual developmental differences by ignoring them, while aspects (not necessarily all) of traditional systems such as that of the Puela (Biersack 1982 and chapter 4, this volume), Gebusi (Castelli, chapter 5, this volume), or Binin-Kaskasim (Poole 1990) explicitly attend to them.

Change in socialization practices can therefore alter the choreography between social experience and biological maturation. For instance, if the Puela were to shift to schooling as the primary socializing agent (Biersack 1982 and chapter 4, this volume), it would entail a change from socialization employing the body as a principal metaphor for personal development to one in which external evaluation of performance—behavioral and cognitive—is the yardstick of maturity. Acculturation transition is frequently paralleled by a loss of opportunities for narcissistic display of adolescent beauty, sexuality, or newly acquired status in the formal structure of socialization practices. The opportunities generally occur in the context of ritual ceremonials, courtship and dance, and agnostic male display. But schooling offers such display, requiring a conforming appearance (often in school uniforms paint and other adornments are banned) and demonstrating that downplaying individual differences, diminish opportunities for physical exhibition, and juvenilize adolescents.

In addition to the individual differences observed within populations, maturation schedules establish pronounced variation among them. Age at menarche, which is often used as an index for pubertal timing, may vary widely. Median menarcheal ages reported for Pacific populations represent the full range over which the event occurs worldwide, from 12.7 years of age for New Zealand Maori, to 18.0 for Bundi and 18.4 for Lumi of Papua New Guinea (Eveleigh and Tanner 1978, 1983). Historically, socioeconomic transformations have generally been succeeded by accelerated maturation. Since the nineteenth century, European groups have undergone a pronounced historical trend to reduced age at menarche, so that, for instance, working-class girls in Oslo, Norway, experienced menarche at age 13.5 years in 1940, over two years earlier than they did just eighty years previously (Brudevold, Liestøl, and Walløe 1979). Because of the accelerated maturation rate, height for age in children has also steadily increased through time (Brundland, Liestøl, and Walløe 1980). These temporal changes
in developmental schedules have been termed secular trends (or, more precisely, positive secular trends) (Tobin 1983). Secular trends have also been reported in the Pacific (Zettel and Jenkins 1989), but the relevant studies are few. Measures of children in Western and American Samoa, and among Samoan migrants to California, have indicated that Samoan children develop more rapidly in California, less rapidly in American Samoa, and least rapidly in Western Samoa (Kioden and Zarnotz 1986). These differences were apparently due to effects of modernization.

While myriad causes for secular trends to earlier maturation observed in both Western and developing countries have been proposed, no unified causal model exists. Acceleration of nutrition and health and other environmental improvements have been consistently implicated (Beklicki 1986, Liestol 1982). Similar factors are also thought to mediate the widely observed relationship of socioeconomic status to rate of child development and menarchal age (Bogin 1980: 209-54). Thus, the sensitivity of maturational schedules to environmental quality find expression in the variation within groups and among populations, as well as in the considerable change within populations over time.

MATURATION AS A BIOSOCIAL PROCESS

In several respects, then, human development can be understood as the result of both social and biological processes (Worthman 1985). Even the timing of maturational events, which is generally considered to be “hard wired,” represents an outcome of the interplay between the body and its environment. From this perspective, maturational schedules and developmental outcomes are to a degree socially constructed. Except perhaps, in the study of cognition, the role of socialization in the actual physical organization and functioning of individuals is rarely studied. Various lines of evidence suggest, however, that this role is an active one.

Indirect support for the importance of social arrangements that shape child development comes from literature on the above-mentioned secular trend, which documents parallel changes in rates of child maturation with temporal change in patterns of nutrition and health. These influences commence in utero. Fluctuations in health conditions of mothers (measured in age-specific mortality rates) in Sweden during the nineteenth and twentieth centuries were followed by parallel fluctuations in menarchal age of their daughters (Liestol 1982). Poorly nourished or stressed mothers are also more likely to have low birth weight infants, who, in turn, have poorer prognosis for survival and development (Macaroff 1968; Tanner 1973: 46). These data further showed that lower menarchal age correlates with higher gross domestic product at year of birth (Liestol 1982). After birth, the influence of behavioral variables intensifies. Cub-
aturally determined early patterns of infant feeding (sucking schedules, weaning practices) can interact with other environmental variables such as disease or nutrient availability to influence rates of infant development (Detwiler and Fishman 1992). Analysis of historical records of annual measures of Chile schoolchildren reveals that attained height by age closely reflects weaning, then improving, concurrent nutritional conditions during World War II (Brundtland, Lecoual, and Valdés 1986). Children exhibit not only slowdown but also catch-up in growth in response to short-term changes in environmental quality (Fauer and Fishman 1992). Known mediators for these effects include nutrition and illness; the contributions of other factors—stress, climate, photosensitivity, activity patterns—are less well understood (Bogin 1988).

Such findings illustrate how environmentally mediated environmental conditions influence child development on several levels. First, scales may exert an acute (short-term) effect by acting through immediate, reversible suppression or enhancement of growth rates. Second, environmental circumstances may have an organizational (long-term) effect on the developmental trajectory of the child. For instance, physically stressful treatment of infants in the first two years of life (starvation, circumcision, cradleboarding) appears to lead on average to earlier maturation and increased adult height (Whiting 1985; Landauer and Whiting 1981). Third, conditions may operate on development through selection; one explanation for the secular trend towards that rapid growth may be more likely to succumb early to poor environmental conditions (Ellison 1981). Improved environmental conditions would presumably lead to differential improvement in the survival of early matures.

Antecedent experiences and concurrent influences moreover alter the timing and course of puberty. The same early conditions that enhance child growth are also associated with earlier maturation (Kuhn et al. 1995). In addition, maturation of adolescents is sensitive to concurrent nutritional and activity patterns (Warren 1980; Brooks-Gunn and Warren 1983). Pubertal development is therefore in part an autonomous developmental stage and in part an outcome of prior category.

The generalized overview of behavioral-environmental influences on physical maturation of children has overlooked an important systemic source of individual variation: gender. Interactions of gender with environment influence development in two ways. There are, for one, sex differences in environmental sensitivities and developmental responses. Then, social custom frequently dictates differential treatment of boys and girls according to cultural models of child need and value (Worthman 1990). These dual factors generally act in concert and vary so widely across populations that it is difficult to dissociate their effects through comparative studies. There is sound theoretical and some empirical support for the expectation that girls will be more highly bu
ered from environmental influences on maturation than will boys, who should therefore show greater sensitivity to environmental quality (Stinson 1983). It is known, for instance, that males have higher caloric needs for weight at all activity levels than do females (Lowrey 1975:147, 151), and that male mortality exceeds that of females at all ages when conditions are equal by sex. But the pattern may be more complex than that (Gailer et al. 1981, 1987). As yet unexplored systematically is the extent to which, and in what respects, males and females show differential sensitivity to specific environmental circumstances such as stress, workload, thermal load, photoperiod, or micronutrient availability (see, for example, Angold and Worthman 1995). Furthermore, the degree of environmental vulnerability may vary by gender at different developmental stages. Sex-differentiated sensitivity may explain the consistent disagreement over which sex benefits more developmentally from improved environmental conditions.

Societies regularly differentiate treatment of children by gender; many allocate resources preferentially to boys. These practices may either actually accommodate greater male caloric requirements and vulnerability to disease in nutritionally stressed populations, or they may differentially meet the material needs and demands of boys. In the process, one could conjecture that such practices may also set males and females on developmentally different tracks in the ontogeny of resource use. That is, constitutional energy sparing in girls is reinforced by early deprivation, thus enhancing the apparent gender difference in energetic needs in that population. Socially sanctioned sex differences in health care provision, living conditions, or workload are also abundantly documented in the ethnographic and biomedical literature (Ley 1990). Differential treatment of children is often legitimated by perceived difference in need or value by sex and becomes integral to the process of gendered social construction of the life course.

Socialization for gender roles typically dictates sex differences in activity, and material and social living conditions. The removal of boys in mid to late childhood from the maternal household to the masculine world and work in several New Guinea societies (Bimin-Kukummi: Poole 1982; Bumbun: Leavitt, survey; Gebusi: Krafft 1987; survey; Marind-anim: Buse 1992; Sambiri: Hagg 1986; surveyed in Hard 1989)), illustrates this phenomenon. While the practices arise from specific ethnopedagogic models of masculine development, the de facto effect is to alter the living and sleeping conditions, daily companions, and nutritional status of boys. Ritually determined food taboos or prescriptions, encouragement or requirement of hunting (with attendant meat eating), and strong reductions in domestic workload all enhance the nutritional and energetic status of boys entering the men’s world. Girls in these populations have been less carefully studied (but see Cantrell, chapter 1, this volume; Leavitt, survey), but the net effect of their remaining with the maternal unit is that their diet,
companions, and living conditions can be expected to show little systematic change over the early life span. If anything, the one systematic change with age is increased domestic and garden-labor, often with the motivation of demonstrating marketability by displaying compliance, productivity, and diligence (for example, with the Marind-anim; see Busse 1990).

Gender as well as group differences in physical development and body habitus are therefore important social products, as much as the developmental profile of a gender or a population largely reflect environmental circumstances—including culturally mediated arrangements—under which children develop. In this sense, then, the physical development of children may also be seen as socially constructed. It seems more broadly accurate to say, however, that child development occurs as a result of interacting biosocial processes.

**ETHNOPEDETRICS AND SOCIALIZATION**

Culture-specific models of child development are a key basis for understanding systematic ways in which culture interacts with physical development of children in the context of persons. Ethnopediatric models of child development provide guidelines that inform socialization in others' perceptions, intentions, and evaluations of the developing individual (Havighurst and Super 1966). Empic views of child development vary considerably among societies, leading at first glance some support to the notion of culture as detached from biology. Closer inspection reveals that such models do reflect an awareness of maturation as arising from biosocial processes what varies is the degree of emphasis on the role of nature or of cultural continuity (Wurderman 1995).

The concept that growth and physical maturation occurs, on the whole, "naturally" is common in the Pacific that is, no cultural interventions are deemed necessary to attain reproductive maturity (and groups discussed in this volume [Rotuma, Vanuatu] and in the classic ethnographic literature [Marcus Mead 1939, Sariruc Mead 1938, Trobriand Malinowski 1935, section 2.7]) view development in this way and do not prescribe social interventions to ensure that proper physical maturation does occur. Such societies do, however, differ in the degree of emphasis on age-grade terms (Lepowsky, chapter 6, this volume), reflecting variation in social marking of developmental or life-cycle status. Maturation, though viewed as natural, may also be closely monitored by the culture. Further, the cultural perception of development as natural does not preclude applying rites of passage and other ritual markers of mature age. Status markers and rituals are legitimated in this context by their social effects, locating and incorporating the physical maturation process in the social-developmental one.

Alternatively, societies may view physical maturation as socially achieved
and conceived as a process that does not occur without consequences. Concerned social intervention societies subscribing to this model, that are described in this book are in Papua New Guinea (Bumulta, Paela), but similar beliefs may be found across other Melanesian (Hend 1986). The view of child development as requiring social effort takes alternate forms, not concerning what parents should do for their children, but rather concerning what elders must do to them. In both such schemes, child development is understood as a physical direction because it includes a notion of social agency. Paela and Bumulta each describe proper child growth to the agency of parents, Samihim (Lenn, survey) believe that the spiritual energy of parents (transmitted through parental care and cultivation) is expanded to make their children grow. Potential aging occurs in a direct function of investment in children, therefore, growth of children occurs at the physical expense of parents. Paela, on the other hand, believe that stringent material observation of menstrual prohibition, labor and magic is prerequisite. Though not sufficient, for optimal development (Brenach, survey). Both of these societies emphasize what parents do for children, while those such as Hausa-Kikuswises or Marind-ans emphasize what is done to them.

Gender ideology appears to drive the complex spiritual-material concepts of social agency in development that prevail amongst some groups of Papua New Guinea (Kneeling 1989). Proper adult gender differentiation is thought to occur only through ritual interventions in masculinized development. In this view, the gender of default is female, and masculinized identity is contingent; perpetuation of the spiritual-material sphere represented by the masculinized requires careful, sustained (often lifelong), coordinated effort by men in the raising of boys by men, and the maintenance by men of their masculinized identity. This process involves sometimes elaborate symbolic rituals related to food, body fluids, and gender-differentiated body forms and function, through ritual and personal practices, to spiritual concepts of gendered opposites. For instance, Paelo (1987) details a progression of dietary rules that male Hausa-Kikuswises in autonomous groups observe. Gehilli (Kneeling 1989; survey). Marind-ans (Mauer 1983) and Sambis (Hendt 1986, 1989) each exemplify the cultural belief in some areas of Melanesia that semen transfer is required for proper masculinized sexual development (Hendt 1986). This practice is supported by beliefs that semen as a life force is a fluid resource that must be carefully guarded and passed from man to boy; boys are thus thought of as literally inseminated by sex. Socialization practices concerning male adolescents in such societies apply a concrete biological notion of making boys into men that connects directly with gender metaphors and concepts of proper masculinized social-behavioral development. Paelo (1987; 1989) notes that Hausa-Kikuswise initiatives come to link the process of self-definition with bodily transformation, in that cognitive, emotional, motivational or behavioral change is associated with bodily reconstruction in an irreversibly ontoge-
The outcome, psychological fusion in adult identity maintenance, is reflected in the role-sharing practices of Samoan men (Herdt 1982). In contrast to societies believing in "natural" growth, status markers and rituals are legitimated in this context through their physical effects, identifying the social developmental process with the physical maturation metaphor.

"Active" growth models can also include notions of personal agency or responsibility in development. Here, the individual is viewed as being to some degree responsible for his or her own physical maturation through ritual observations and other appropriate behaviors. Again, Eberhard and Bambaka provide an instructive comparison because each incorporates a concept of personal efficacy, while their assumptions about agency differ widely. Eberhard appears to interpret individual agency with particular concern, expecting that both girls and boys will "grow themselves" by adhering closely to ritual and personal hygiene formulas for achieving maximum physical perfection (Eberhard 1958: chapter 4, this volume). This belief in skin and hair particularly emphasizes in achievable in the way to be notable, for both closely reflect physical well-being. Such cultural attitudes led again to a view of growth and maturation as a manifestation of behavioral or ritual correctness that places development in a moral framework. Bambaka represents a further approach, by extending responsibility to the individual for internalizing socially taught practices (how and amount of food or sex: purification and avoidance behavior) and appropriating the process of personal development. Lawrenson (1973) has observed of Bambaka youth, "After the onset of adolescence, the males sense of his physical maturation pairs with a sense of spiritual maturation that behimself controls. He knows that to develop into a man, he must take matters into his own hands." In this case, taking matters into one's own hands means that young men must increasingly internalize responsibility for maintaining their own physical integrity by continually cultivating a balance of spiritual energies through correct behavior. They must, for instance, avoid sexual intercourse to avoid loss of spiritual force and consequent stunting of growth. Similarly, self-performed genital bleeding among Bambaka (male circumcision among Samoans) (Herdt 1982) must be pursued purposefully but in moderation to maintain spiritual-physical balance. Observation of footbaths likewise depends largely on self-imposition. With transfers of responsibility from others to self for continued maturation, eroticization and structuration become increasingly identified with self-defining acts (Town 1987).

Finally, a society may view physical development as socially facilitated, neither driven by nor requiring social intervention, but influenced by it. Samoas, for example, believe that physical punishment of children stunts their growth (Herdt 1982:68). Since female maturation is more frequently viewed as natural, practices to accelerate or augment female development are more common than those to direct it. Puberty in girls is at times thought to be induced or hastened.
by cohabitation or intercourse with a man. Iezsink (1987) reports an Australian Aborginal notion that cohabitation promotes breast development. Such beliefs legitimate early marriage. A common goal of seclusion at menarche and ritual reintegration to the community is the protection of a girl from pollution and other dangers to her physical well-being, as well as consolidation of her maturational gains and promotion of her beauty and marriagability (see, for example, Castrell, chapter 5, this volume, on the Gebusi). For Hambita or Isihita Apech, a prolonged stay at the time of menarche is meant in part to help enhance the girl's physical attractiveness (Leavett, survey, Tain 1980:34-35), as it was also thought to do for the Chambu (Brown, survey, Ross 1985; Whiteman 1985).

Different culturally embedded concepts of physical maturation commonly coexist within a single cultural framework. In both, a great deal of child growth may be presented to proceed naturally, while elements that are thought to require social or personal agency are foregrounded. Generally, development is viewed as more "natural" for girls than for boys. The previous review of pubertal development demonstrated how gender differences in timing and kind of maturational changes support this view. Hence, societies commonly employ dual, gender-differentiated models of development, with females being more "naturally" and males more "socially" constructed. Gebusi (Castrell, chapter 5, this volume; Ensuf 1987) employ such a dual model, as indeed may all other Strekland-Bosavi groups. In this context, gender-dichotomized tracks for physical as well as social maturation play a powerful role in foregrounding the masculine in social life. Thus, Eileen Castrell (chapter 11) stresses the need for concerted intervention by Gebusi women to create "developmental space" for "naturally" maturing girls to offset the pervasive masculine social ethos that is reinforced by activities undertaken to make boys into men. Further, one suspects a connection between the unique features of child development reported in New Guinea and the prevalence of elaborate social constructions of physical-spiritual development. Compared to other Pacific populations, children of Papua New Guinea are quite small, and their growth is markedly slowed. Reported ages at menarche for some highland groups—at 18.0 for Bundi and 20.3 for Gini—are very late (Malcolm 1970; Wood et al. 1985). The question of cause—whether caloric and protein deficiency, trace element and micronutrient deficiency, disease pattern, or other environmental stress—is has not been resolved, although each of these has been implicated (Demott and Castrell 1985). Introduction of dietary change and urbanized settings has been shown to lead to accelerated growth and earlier age at maturation: rural Pindis have, for instance, experienced a drop of about 1.2 years in age at menarche within an eighteen-year period, and endocrine as well as growth measures indicate that maturation is especially accelerated in urban adolescents (Zedd and Feakins 1985; Zedd, Worthman, and Jenkins 1995). What effect do such changes in maturation rates and physical attainments
have on the social construction of development? This question has not been explored systematically but may be important because secular trends are occurring worldwide. Under social change and accelerating pressure, one would expect cognitive schemas of social agency in development to be more vulnerable to challenge than the "natural" or "facilitated" views because the literal notion of social agency can be falsified by empirical observation of other peoples. Turin has documented this effect among the Kula Hausi Kula:

Today's young adults grow up with an open awareness of the outside world, and it is impossible for them to share the bewilderment and suspicion of their elders in the face of radically alien cultural forms. Increasingly, these concerns and activities are where the Voice of the Tambaran [a male cultural motif] cannot reach them. (Turin 1986:32)

Issues of control appear to be particularly central in societies that view maturation as socially controlled or facilitated. Among other things, such a view gives a semblance of command over biologic processes by making it appear accessible to social-behavioral interventions. The re legitimizing of that control can be a disorienting prospect. As evidenced by Itoh's use of finishing school to dramatize the onset of "youth" (Howard, chapter 7, this volume), school often becomes the pacemaker of development. But the challenges posed by social and biological change to socialization systems arise perhaps from a deeper level of function, one that is often hidden from the conscious domain. Socialization practices of whatever kind, relate physically with social-behavioral ontogeny in ways that may significantly influence outcome. For instance, Poole (1985) has suggested that high suicide rates among Rimic-Rukum men reflect internal contradictions in the long, deliberative initiation cycle that they undergo. One could conjecture that changes in socialization incur unintended changes in developmental outcomes by altering the relationships of biological with social states or experiences. High suicide rates reported among adolescents (Rubenstein 1982) or adults (Gain; women; Johnson 1980; Rimic Kulaivam men) in widely different societies around the Pacific indicate the problem is not associated simply with social change or with a specific age or gender; rather, the causes are to be found in locally specific life history conditions.

This section has examined development as a biocultural process, comprising reciprocal effects of cultural and biological factors. Culturally conditioned behavior and environment (for example, substance patterns, housing, dietary practices) exert marked effects on development from infancy through puberty, affecting both timing of maturation and events and phenotypic outcomes. Biosocial dynamics in ontogeny are most vividly evidenced in sex differences: constitutional somatotypes are molded by both cultural effects, including sex-differentiated care, and phenotypic consequences of differential socialization practices. A fur-
ther level of biosocial interaction occurs in ethnopedagogic models of development that guide social actors. Pacific island societies show a range of approaches, viewing development alternatively as natural, socially facilitated, or socially achieved: each encodes distinct views of relations between individual and society. Societies commonly subscribe to multiple models: a number view female ontogeny as more "natural" and that of males as more "contrived." Social change affects socialization and physical maturation and thus alters biosocial relations in development throughout the Pacific.

RELATIONS OF INDIVIDUAL AND SOCIETY IN ONTOGENY

Anthropologists have tended historically to study socialization practices on the generalized, shared formal, or group level. More recently, some Pacific ethnographers have attended to the individual level of subjective experience and construction of life history (R. I. Levy 1973; Hercu 1982; Leavit 1991, 1995a). Socialization systems must operate in both these dimensions; that is, they act at the interface between individual and other. Analysis of how socialization practices work on the individual, everyday level may allow construction of a pragmatic view of how the two dimensions—individual and formal/shared—are linked in ontogeny. An analytic framework for addressing this issue should not presuppose whether, how, or to what degree individuals or societies elaborate a distinction of self and other, for the latter is itself culturally shaped. On the one hand there is the field of social action composed of both individual and others. In this arena, only the visible or enacted aspects of the individual participate. On the other hand is the invisible arena, composed of physiological states and processes, as well as cognition and affect. Internal states and experiences are not directly observable by or shareable with others, and are therefore necessarily at some remove from the external, transindividual field of action. In this scheme, then, transduction between intrasocial domains that lie outside the realm of social communication, or even of cognition, and the social domain is effected by individual behavior and appearance, and the biosocial construction of the field of transduction becomes an object for analysis of socialization.

A socialization system can only work within some phenomenological framework that mediates between social process and the young, the new members of society. However elaborate the superstructure of metaphor and conceptual complexity that informs the content of socialization, the model must be one of directional change. How a society channels developmental change does, again, vary widely, but must include prescriptions for the treatment of young persons. While, on the phenomenological level, such prescriptions involve the visible, corporeal person, the invisible, internal dimension is also necessarily involved.
This internal domain is where physiological processes occur and effect physical maturation, and where knowing, understanding, and motivation are organized to allow the individual to perform in a socially competent, appropriately productive manner. While the existence of an internal domain is constant, the degree to which internal states are attended to, cogized, and elaborated varies across cultures and is itself a target of socialization of self and the relationship to oneself.

Consequently, socialization faces an inherent problem: it can only work indirectly, for internal states cannot be accessed directly. For one thing, socialization practices can only attempt to organize intra-subjectivity through manipulation of experience and environment, with relative on processes of “internalization.” For another, the sole means by which internal states can be known to others is through discernible, corporal manifestations that allow monitoring of the process of individual development. These cues include behaviors (speech, demeanor, activity and work patterns, and other social performances) and physical appearances or functions (growth, physical well-being, and other material changes) from which the developmental states of the person is inferred. Observances are drawn through the filter of cultural norms and expectations about the goal and content of the developmental process—local ethnopsychiatric schemas about development, caregiving, and socialization (Worthman 1995). The resultant evaluation (that the person is, for instance, “old enough,” “just a silly kid,” “too lazy,” “ready to marry”) guides further treatment of the youngster.

Discernible cues, then, entrain socialization; because the nonvisible domain is not directly accessible, the visible person often stands proxy for it and is the benchmark of individual ontology. Implicitly, the duality in (visible or not visible) engaged by socialization recognizes that culture is as much a product of the organizational bases of behavior as of the behaviors themselves.

On the level of social action and everyday experience, then, the nonvisible, internal domain is a “black box” to others, although cultural identification of the external with the internal self may be so strong as to render them experientially seamless. The phenomenologically hidden dimension of internal states comprises physiological, cognitive, and affective facets that are tightly interwoven. (Since 1968, 1990, Worthman 1992). While socialization practices expose individuals to experiences that may in itself restructure aspects of cognition and affect, these experiences often have recordeffects on physiology. A simple instance can be drawn from previous discussion concerning growth rate and diet: a dietary regimen to which boys are subjected may be intended to establish masculinity (conceived in terms of spiritual forces), but may also influence growth rate and enhance pubertal development by altering protein and calorie intake. More subtly, forging of links between cognitive-effective and physiologic states through ritual experiences that tightly entwine them both may establish biologi-
cal as well as cognitive dimensions to the organization of behavior. Indirect evidence of this phenomenon is provided by the differences in organization of male aggression across the Pacific: aggression (comprised of physical and cognitive elements) is quite differently expressed by Tahitian or Marquesan interlocutors (Levy 1977:248–258, 467–49; Kirkpatrick 1987) and Bambuti Bakwer (Leavitt, chapter 8, this volume). Bakwer’s assertiveness and frustration quite differently, so that the “wild” behavior by each differs in context, content (the former is defined by aggressive-instrumental display, the latter in opportunistic, hedonistic, exploration), social interpretation, and prominent organizational base.

So far, this discussion has identified two general ways in which indirect effects are exerted by the social conditions under which young people grow up, first through influences on the physical maturation process itself, and then by shaping internal organization of behavior and experience (cognition, affect, physiology, and the interactions among these). This notion can illuminate effects of social change: alterations in social arrangements and formal socialization systems may have multiple and unanticipated, unanticipated consequences in the kinds of persons the young become. Social change renews the seeds of developmental processes to reveal a “hidden” dynamic between culture and biology. This dynamic core, while generally intangible and transparent to the actors and the formal systems (Berger and Luckmann 1966), plays a role in driving the process of differentiation and thus aids in literally constructing the individual. The importance of social arrangements to notes and arrangements in physical development has been stressed above. Therefore, altered patterns of physical maturation can be expected to follow from changes in social arrangements so that even the physical person targeted in socialization would no longer be the same.

Biological dynamics are set in train by a system of socialization that can be disturbed when social conditions change, and disruption of this dynamic can provoke or reinforce crises of socialization in unforeseen ways. This point finds clearest expression in societies with elaborate traditional socialization. Bimin-Kukurermin or Halita Arapesh were are the product of a complex dynamic between individuals and their socially constructed experiences (ritual, diet, activity, housing, relationships); if the dynamic is altered, then men will indeed be different. Recognition of the depth of acculturative transformation is reflected in the continuation of the process from Tuzin on Halita Arapesh, quoted above: “The older people view this trend with sad resignation: for they know that the Tambaran will not sing if it is not heard, and that when it song stops, the world—their world—will end forever” (1989:133; see also 1997). The tone of change in socialization is not always one of wistful regret; often, parents became convinced that a new order offers the best opportunity for their children, and that new order requires new sorts of persons, persons that they do not know how
to create. Such parents, whether eager or ambivalent about social transformation, may push their children off for novel experiences—in education or government schools, as migrants, and in new forms of labor—in the hope of establishing a foothold in the emerging modern regional or national sector. Some chapters in this book provide a look at the effects of social change. Burkhart and Chilcot, and also Howard, deal with transformations of adolescence and young adulthood in school-age youngsters, where the horizons of what children are socialized for have widened dramatically but have not lost some, but by no means all, of their local specificity and legitimacy. For Australian Aborigines, issues appear to revolve around social control of reproduction, while for Romani, youth as labor force appears not. Rubinstein (1992) traces these threads to the high rates of adolescent suicide that punctuate the social fabric of Australia.

Lever (1977: 466–8) has proposed that mastery of the most critical and central behavioral repertoires for a society are over-determined by multiple redundant socialization influences, and that such redundant structures are a necessary feature of the most culturally determined behavior. Redundancies should rival the socialization system, not resist or impede through social change, and indeed we see that the descriptions of more acculturated Micronesians or Aborigines given by Howard (chapter 7, this volume) and KirKPATRICK (1987) or Burkhart and Chilcot (chapter 3, this volume), respectively, do not show many people thoroughly identifying with national or world perspectives. Rather, there is a complex involving in life history that draws threads from traditional and modern forms. Still, these are, in a biosocial sense, different persons from their historical counterparts.

SAME SOCIETY, DIFFERENT PEOPLE

While the literature may impress us with the tremendous cultural diversity of adolescence, there is a large residue of variation within cultures that anthropologists have explored less carefully. However, whereas rigorous the system of socialization, children, adolescents, and the adult may not be homogeneous persons, even when the social impact appears to be. Instead, there is considerable personal diversity, social as well as biological factors account for this. First, socialization systems have stochastic properties, so that timing, quality, and quantity of formative experiences are vary widely among individuals. Through historical accident or even formal social design, strong deviations in life history are nearly normal; for instance, children may find themselves in large or in small households with missing or older parents. Boys may be raised at seven or twenty-two, and young people experience varying degrees of environmental or social support. Mend’s (1989, chapters 3, 8) observations of how variation in household composition and social status af-
fected the behavior development of young female women illustrating this point.

Constitutional variation—in appearance, temperament, physical functions, and developmental programs—supplies another source of individual differences. But only do these constitutional features shape developmental outcomes directly; they also affect the pattern of biocultural interactions between child and context. This is, how children look, function, and behave influence how they are treated and set up dynamics that significantly alter their experiences (Lerner and Busch-Rosengart 1978; Scarr and McCartney 1983). In addition, the degree of congruence between demands and opportunities offered by a social setting and the abilities and characteristics of the child clearly differ widely among individuals and settings. For instance, the contrasts between traditional village settings described by Bierstedt or Cantrell (chapter 4 and 5, this volume) and the settled Aboriginal community described by Burbank and Chisholm (chapter 3, this volume) or modern, educated, wage-oriented, enterprising Papua New Guinea described by Paul Brown (1988) lead to the prediction that a timid, compliant girl would perform quite differently in each. Social management of adolescent sexuality also demonstrates the point: papers in this volume reinforce our awareness of the degree of documented cross-cultural variation (Whitney, Burbank, and Bierstedt, 1986), from the self-structured permissiveness of the Trobrianders (Kalinowski 1929), to the rigidly regulated and circumscribed sexual activity prescribed for adolescent Mimbi-Kukpurwh (Pude 1962), Kowuna (Whitney 1984), Gobaii (Cantril), chapter 5, this volume), and Bumbina (Lewis, chapter 4, this volume). Domains of highly prescriptive socialization can be expected to be far more demanding and less tolerant of personal vagaries. For instance, the importance of properly arranged "straight" marriages in traditional Aboriginal life fuels current intergenerational struggles over reproductive control or autonomy (Burbank and Chisholm, chapter 3, this volume).

Individual variation also poses a challenge to socialization systems, which must somehow accommodate not just the modal normative child, but all (or most) children. This must be done in the face of developmental vicissitudes created by systemic and stochastic variations in social landscape, environmental quality, and individual constitution and ability. The social setting may indulge individual variation by bending socialization rules, shifting expectations of conformity in performance, and tacitly or formally recognizing alternate developmental pathways. Or it may recognize but refuse to tolerance certain deviations and seek to suppress them through socialization. But alternate development pathways must be allowed and often are fostered in socialization. The most usual divergence in a developmental course is organized around gender: males and females are placed on their own tracks through life. In Papua New Guinea, boys being initiated are often called selfish, weak, and feminine; initiation is de-
signed to eradicate these traits, while girls are left to occupy their "natural" and "not male" qualities (Herdt 1986). But even something as fluid as "paternity" defines separate niches in the microecology of social space, for the partitioning of social roles often occurs in response to individual differences (see, for example, Schieffelin 1986). Accommodations may be made for a series of expected variants that range across conceptual spectra defined in some terms good-bad, small-large, fast-slow, difficult-easy, strong-weak, attractive-unattractive. Both biology and behavior play a role in recognized individual variation. Personal differences may be ascribed to inherent/biological or acquired/learned causes, and people may even debate the hereditary or behavioral components of a person's being short, stocky, or aggressive (Chowning 1990; Schieffelin 1986). Such classification and discussion alone imply that individual variation is socially engaged.

Societies may also reward or punish its members for such social roles. Even in small egalitarian societies, there are developmental pathways that lead to special niches (performer, artist, healer, diviner, leader) (see Samuel 1990, for an attempt to model such processes). In more stratified groups, there is a greater diversity of niches but greater social regulation in their assignment. Societies, then, incorporate a finite multiplicity of recognized life course alternatives.

A key means, of course, by which social change influences the social organization of the life course lies in rerouting the menu of life history alternatives. "Goodness of fit" between individuals and the developmental courses open to them is thereby altered: characteristics that were favored or enforced may be detriental (as when tribal warfare is eliminated), while others that had scarcely found expression may be advantageous (as with the introduction of schooling and jobs for girls). In settings of social change, there is an apparent proliferation of alternatives, but the accessibility or viability of any one of them may appear attenuated. Introduction of schooling, wage economies, entrepreneurship, Christianity, and national ideologies as another array of factors shaping life history, factors over which it is much more difficult to take control because the scale is so altered and their modes operate is relatively unknown.

As R. Brown (1988) describes, Chimu girls may today "hit the road" in search of boyfriends and new experiences, or they may stay home with the precarious security of an ending way of life. Their male counterparts may try diligence at school, peer solidarity in opportunistic endeavors (gangs or stealing), or individual seeking of the main chance. For both sexes, the characteristics defining mate selection and the process by which it occurs also change dramatically. As the situation described in this volume by Boeck and Chiebilm (for Australian Aborigines) portrays, links between generations open when youth and elders disagree in their perceptions of viable choices for directing the life course.

Instances of erosion of the formal traditional system of constructing life his-
tory found in this volume reflect of course a long-standing theme in the literature (Mead 1949, 1966). Institutionalized "time out" for narcissistic expression and sexual freedom in adolescence and young adulthood has often been reported for Pacific peoples (Talbot, Levy 1957; Sarnoff, Mead 1938; Marquiss, Kirkpatrick 1987; Vercoski, Leopawsy, chapter 6, this volume). The *naevourie* of Tahiti and *kanivie* of the Marquesas were distinctly adolescent statuses that Levy suggests may have had the quality of "antistructure" (1973:469). These have become more vague categories (mara and maravie, respectively) that are defined in terms of behavior content because they now compete with other competing identities (student, Christian), among which clear pathways to adulthood are not easily discernible (Kirkpatrick 1987). These roles, then, simultaneously express and conceal real problems and uncertainties in the transition to adulthood; the resolution of their apparent enviable freedom, self-expression, and exploration to a well-grounded everyday adult life is left largely to the individual. The roles reflect gaps in the system of socialization that are created by general social uncertainties about how life histories are to be constructed and meaningful situations secured in the modernizing world.

Such ethnographic cases indicate that social change in the Pacific radically restructures the relationship between the physical and the social self in life course development. Chronological age is substituted for reading the body and behavior as signs of maturity that entail socialization efforts; schooling proceeds regardless of developmental status of the individual pupil. Inscription of culture on the body (invocation, superincision, culturally mediated regulators of maturation and physical well-being) and the biosocial processes of internalized self-definition assume novel forms and individual developmental trajectories appear to happen, in spite of, or against, some prevailing social arrangements. An outstanding feature is the often radical modification of the relationship between the reproductive self and the social self. Biological maturation schedules shift downward in age so that young people are faced with reproductive decisions earlier. Spouse selection and timing of marriage shift the bounds of traditional forms and become more self-determined. Timing of marriage is set by new priorities such as schooling and wage labor. The meaning, as well as the realities, of reproduction assume new forms. All these transformations reflect, in yet another way, the interdependency of biologic and social process in human development and life history.

CONCLUSION

While contemporary anthropologists have problematized the relationship between individual and society, the present analysis has sought to cast the problem rather differently, in a way that includes both biological and social processes,
Historic divisions of labor between cultural and biological anthropology in the study of human development have led to a dualistic understanding of social and physical ontology: adolescence has been separated from puberty. Thus, the biological domain has not been adequately addressed in contemporary ethnography and social theory. This chapter suggests a different developmental perspective that may better account for variations across time and space by taking an explicitly biocultural stance. The necessity for a reformulation is demonstrated here through analysis of interactions between social and biological factors in adolescence: biology relies on social context in physical development, while society relies on biology in shaping persons.

Rapid social change has emerged as an important issue in this chapter and in this volume. It accentuates the need for a biocultural perspective on human development, for the present analysis suggests that the lack of such a perspective has impaired our ability to understand and predict the effects of social change on people's lives and experiences. The ethnographic accounts in this volume document societies from the "pristine" traditional to the strongly acculturated, yet nearly all contemporary peoples in the Pacific are experiencing accelerated social change. As has been reviewed here, such social change has been associated historically with changes in socialization as well as with alterations in physical maturation schedules. Yet the relationship between these two parameters of change in human development has scarcely been explored by anthropologists. Pacific societies document biological and cultural diversity in puberty and adolescence, but the existing literature on these peoples demonstrates the paucity of analysis that includes biological and social measures in studies of socialization. The rich ethnographic record in this region is not matched with a wealth of data on child growth and development.

The present analysis has therefore been more suggestive than definitive in its exploration of the value of a biocultural approach to human development. It has indicated that the production of individual differences may be as important a product of socialization as the production of similarities. Certainly, in the case of gender, biological differences as well as systematic social processes lead to sex differences in development that vary markedly across societies. Thus, in the face of wide biological and cultural diversity, the key element for understanding individual ontology would appear to be not so much formal content of socialization per se, but the local (historical-contextual) process through which the individual develops. Therefore, this discussion has focused largely on dynamics of socialization and how the process is constituted in relation to individuals under specific social conditions. Within a given social context, development can run along numerous socially recognized alternate pathways. While availability of divergent developmental trajectories is highly ubiquitous, those (with the main exception of gender) have received scant attention from ethnographers, whose
goals have usually been to characterize the general, normative workings of cultural systems. How those systems create and accommodate, rather than simply eliminate, differences has been less a matter of concern. Understanding of social change may thus be furthered by studying its effects on the channels regulating production and accommodation of individual differences.

Contemporary anthropology has attended to the individual and the social construction of persons and their life histories. Yet modern anthropological devotion to particularism has sown a meager harvest in understanding social process in a more general and, perspective way. Work in human development that draws on our past (see, for example, Mallowan; Mead; and Whiting) and the present store of ethnographic documentation (such as that presented in this volume), and incorporates it with a biological perspective, should focus our attention on the systematic, but local and contingent, sources of commonality and difference within and between societies and across time.