

Mr. Porter

We are very pleased to have Dr. William Masters and Virginia Johnson Masters as our luncheon speakers today. Masters and Johnson, who have gained national renown through their work in the field of sexual response and reproduction, are codirectors of The Reproductive

Biology Research Foundation. To list their many accomplishments and publications would be a speech in itself and I'm sure you would rather listen to them than to me. I will, however, mention three of the books that they have authored: *Human Sexual Response*, *Human Sexual Inadequacy*, and, most recently, *The Pleasure Bond*.

Science, sex, and fragrance

**Dr. William Masters
and Virginia Johnson Masters,
Reproductive Biology Research Foundation**

Johnson

We thank the program committee which, in my husband's opinion, paid us the ultimate compliment by referring to us only as "Masters and Johnson" in that familiar manner of referring to someone who has become a household word. For some reason, we find that to be rather reassuring and comfortable.

Our title evolved as the result of a conversation I had about a year ago during a large dinner party of people from the cosmetic industry. This discussion took place with a man who shares responsibility for the destiny of a cosmetic house famed for its fragrances. Although Dr. Masters and I usually appear socially and professionally as a team, on this particular occasion I attended by myself without the accustomed backup we tend to provide for one another. During the conversation I found myself wishing for the "backup."

The setting was large, social, and very gracious but there were the expected professional overtones. As our table talk progressed this man abruptly said, "I'm afraid that any scientific research, especially that which tries to identify natural human attractants, will simply open up a can of worms for the fragrance industry." He made the statement so casually, so matter-of-factly, that I was more surprised than angry. The Reproductive Biology Research Foundation, after all, is committed to various investigations which relate to the potential existence of human attractants. As you might imagine, as soon as I returned to St. Louis I shared this surprising

comment with my partner and other members of our Foundation staff. Most of us felt that his opinion had to be given consideration because of his obvious importance in the fragrance field. Unfortunately the man's further comments that evening provided us with little amplification of his opinion about basic research, so we were left to speculate.

He could have been expressing his own subliminal fear that a natural biochemically-based signal system does indeed exist within the human system and that science just might identify it and upset all the popular concepts of human attraction currently used in creating and marketing fragrances. (At this point I hasten to say that, so far, we do not know if there is a natural human attractant, or what or where it is if it does exist.) So what, if, in the normal course of social change and the inevitable search for knowledge and understanding which it brings, someone does discover that a natural human attractant exists? Might it simply provide another creative inspiration to the fragrance industry rather than a "can of worms"?

Thus, our first speculative conclusion was that the man's position must be blindly defensive. He doesn't like change.

The second speculation led us to assume that he is also unaware that one of the great values of scientific research lies in the unexpected by-products that inevitably develop in the course of pursuing a particular scientific goal. Even negative findings tell us something, especially in a field of investigation where so little is known. Just learning that a natural system of attraction

does not exist—or has become dormant or lost through disuse—would illuminate the study of olfaction and thereby make a contribution to the fragrance industry.

The third and least rewarding speculation led us to wonder whether or not this executive might be a subscriber to the sometime theory that scientific investigation breeds and exists for its own amazement and pleasure. Although many of us may consider this possibility from time to time, reality becomes apparent when personal need arises and we suddenly say, "Science, give me a solution, a cure, or a panacea."

The fact that any of these assumptions may have been behind this man's seemingly casual statement does not make us very happy, but it has made us a little more aware of the implications of our fragrance-related research.

The initial impetus of any scientific investigation in any field is human need. This is something we discovered rather humbly 25 years ago when it became the crucial factor as to whether research in human sexuality was going to be allowed to exist at all. Human need determined that the work be allowed to continue.

Masters

It is amazing to recall that the work in human sexual physiology is almost 25 years old. More fascinating, from our point of view, is the

fact that that early study helped to inspire and produce much broader research in human sexual functioning that helps us all understand why sex researchers are invited to meet with perfumers. We all realize that the arts of communication are fundamental to our respective fields. Sexual function involves both verbal and nonverbal communication, while the creation and use of fragrances is concerned primarily with nonverbal communication. Each field reflects a tremendous interrelation between the various sensory components of human interaction.

Johnson

If indeed scientific investigation is always motivated by human need, then who better than perfumers can be aware of the human needs involved as a natural consequence of social transition. It is my general impression that most members of the perfume industry feel that scientific investigation has a creative role to play in their profession. It seems obvious, in the marketing and advertising of fragrances, that the industry is well aware that requirements people have of one another change, that attitudes eventually modify to accommodate those changes, and that values within the human community also modify in support of the genuine needs of its people. It follows that practices and patterns of behavior change, in part, because of these changes in individual needs and preferences,

and to us as outsiders the fragrance industry appears to be very responsive to these changes.

When patterns of human behavior and lifestyles shift noticeably, there is a subsequent desire to understand those changes, to discover how best to cope with them, and how to live effectively with the conditions which they produce. This often becomes the impetus for scientific investigation. It also can be a signal for perfumers to re-examine the appropriateness of their products. In the search for knowledge in the field of olfaction, or sex, or anything else which affects the quality of life, there should be a recognition of the predictability of social transition. The momentum of social change varies from era to era, but it has rarely, if ever, failed to occur at all.

One of the major points of interest for the developers of the fragrance should be and probably is how people are changing and what their feelings and attitudes are, not about fragrances, but about themselves. Self-image and identity have so very much to do with choice.

When any of us fail to relate our own area of professional commitment to the context in which it exists, we easily can miss important influences. We each have our own way of preventing this. For example, you have market analysis. We use man-woman teams to study, interpret and solve problems. We rarely work individually; we each police the other in striving for objectivity. We are aware that many aspects of research in human sexuality are all terribly important, although it is frequently appropriate or necessary to isolate and focus rather sharply on one particular facet when we are trying to understand it better or to explain it to other people. Our great concern, whether the field is fragrance or sex or any other area of interest, is that such insularity tends to make us forget that there is a context in which the product, or the particular information, is going to be applied or used.

Let us discuss for a moment the thing about which we know least, fragrance and the fragrance industry. We are tremendously interested in both, and they play important roles in our work. For example, there are situations where odor is a crucial factor in our clinical treatment of relationships distressed by sexual dysfunction, and other situations where fragrance is introduced as a bridge to intimate communication between couples who are unable to achieve it by other means. We have observed olfactory response to a single natural note as it provides stimuli to the senses, and similarly have observed response to a sophisticated distillation and subtle combination of many notes. But drawing from our experience with human behavior in the area of human sexuality, we are well aware that the initial sensory impact of an olfactory experience reflects only a part of that total experience.

Sensory stimulation occurs within the context of beliefs and attitudes and expectations. There is an emotional and a physical environment which

influences the individual's perception of the experience, while all this exists within a matrix of social, cultural and religious influence. From history we learn that the importance of fragrance use has varied, and continues to vary as these other factors change. At one time, fragrance was believed to have curative powers and was almost synonymous with medicine. It certainly has been part of spiritual and religious experiences and continues so in many cultures. Most often, fragrance seems to prevail as enhancement and as a signal of identity.

Scientific effort derives from stimuli to the intellect, but its sources of reinforcement are much more far-reaching. Our own position can best be defined as a commitment to the science of sex which includes an interest in olfaction as it applies to our field of study.

Masters

If we examine the correlation between non-verbal communication and our mutual areas of interest, we must begin at birth. We think, for instance, that we are born heterosexual, and of course we are not. We are not born homosexual either. Nor are we even born bisexual, despite what everyone reads. We are born as sexual entities. We learn to be heterosexual; we learn to be homosexual; we learn to be bisexual—on cue.

What are the cues that initially turn the baby at breast from simply an eating and eliminating mechanism into something that begins to identify? Part of this cueing has to do with the sense of smell. Obviously, there is more than just olfaction involved in the early cueing. Warmth, softness, and a full tummy are also involved. All of these are important sensory cues in the non-verbal communication between mother and child. From the beginning, we are first sensuous, then sexual beings.

We happen to think that sexual functioning is a natural function. Most people would tend to agree. However, it is a fact that not one man or woman in our society has been privileged to live with sex as a natural function. Our culture has denied us this privilege. Before I reformed, I used to be an obstetrician. To relieve the tedium of catching babies, I used to play a game with myself in the delivery room. In order to play this game, a baby boy had to be delivered. The game was to see whether mother and baby could be taken care of after delivery in satisfactory mutual fashion before the baby had an erection. I would win about half the time. (**Johnson:** That is not a sexist proclamation. It is just that the studies that define an equivalent response in the female infant were yet to come at that time.) As a matter of fact, many baby boys have been delivered who had full erections before they ever took their first gasp. Is the infant responding to sexual stimulation? Of course not. But one must admit that a certain amount of reading readiness is evidenced.

The studies of infant girls referred to by my

partner took place in the last three or four years and have not yet been published. We now know that baby boys are not the only ones who have a certain amount of reading readiness. Unless they have some manner of congenital malformation or have been significantly depressed by the birth process, baby girls involuntarily lubricate vaginally in the first few hours of life. So we are born as sexual beings with the basic mechanisms for sexual interaction working at birth just as do all of the other natural functions of the body.

If we can accept the concept that sex is a natural function, how in the world have we ever been able to isolate it from all other natural functions? How has our culture demanded that we not be comfortable with the subject of sex?

There is a plausible explanation. All natural functions have one factor in common: the facility for voluntary control. We can voluntarily control each of our natural functions, but for different lengths of time. We can hold our breath, but not for as long as we can control our bowel and bladder function. What about sexual functioning? There are men and women who have denied their voluntary sexual functioning for a lifetime, often on the basis of religious commitment. Any individual who professes to have voluntarily denied deliberate sexual expression for a lifetime may well have done so. This may raise the question as to whether sexual functioning really is a natural function. The catch is that we are only talking about that time in our lives when we are exercising voluntary control. But a significant part of our lives is spent without voluntary control over our natural functions—when we are asleep.

When voluntary control is removed, all natural functions establish a particular pattern of rhythmic response that is uniquely their own. You are well aware, for instance, that there is a change in your respiratory rate and the depth of your respiratory excursion when you are asleep as opposed to when you are awake. You are also aware that the bowel and bladder collecting systems continue to function while you are asleep. What you may not be aware of is that the sexual functioning system also has its own rhythm and pace while you are asleep. Presuming a reasonable state of good general health, every male, regardless of age, has an erection every 80 to 90 minutes all night long, in or out of dream sequence. Men are not alone in this involuntary rhythm of their sexual functioning system. Presuming a reasonable state of good general health, women lubricate involuntarily every 80 to 90 minutes all night long, in or out of dream sequence. They involuntarily produce vaginal lubrication in demonstration of their own natural sexual function.

One of our research programs which specifically correlates with the interests of the fragrance industry is the study of vaginal lubrication. If, indeed, the production of vaginal lubrication is a natural function, what implications

were conceptualized for such a study other than in the further definition of its obvious contribution to sexual interaction?

We have been aware of the subprimate and the higher primate pheromone attractants and speculated the same might be true for the human female. When Michael found some of the short chain aliphatic acids in the vaginal lubrication of the monkey, and ultimately in a few women, it was thought this was a possible orientation to sexual attraction. He conceptualized in this direction; we worked in this direction. And we were wrong.

One of the great advantages of scientific investigation lies in the opportunity it provides to look at something for a while, learn that your findings don't completely hold up, and be able to start over. The work within the fragrance industry of Goldfoot and Freeman counteracted the Michael work. Because there may not be significant pheromone production, it doesn't mean that vaginal lubrication isn't an important research area. The new challenge is in defining the biochemistry of vaginal lubrication. We are not just interested in short chain aliphatic acids at all. In order to define the attractant, if there is such a thing, we not only must define the biochemistry of vaginal lubrication, but we must also identify the changes in vaginal lubrication with the cyclic influence of female steroid variation. It is an enormous task and will not near completion in less than five years and possibly not in ten years.

The vagina is an active organ with its own physiology and its own biochemistry. To isolate a single agent and hope to establish it as an attractant has obviously been an error. One certainly could establish whether there are attractants in vaginal lubrication, without identifying the individual attractant, by employing a simple set of clinical experiments. This could be accomplished in the matter of a year or two. If there is such an attractant, there would be even more reason for doing the definitive research into the biochemistry of vaginal lubrication.

Johnson

Let us return to our thesis that it is a mistake to look at any aspect of a particular field on a one-dimensional basis. We were guilty of this in our zeal in the beginning of this work. People were asking for help in terms of sexual problems that were oriented to specific sexual distresses and dysfunctions and to the need simply to have answers to questions. Our initial concept, very lofty, well-intended, was so designed to replace myths with facts, put the facts in books, and in the public domain. We woke up, with the help of a little nudge from other people in the health-care professions who had at one time or another tried to help someone with a sexual problem. It was pointed out to us that facts are well and good. But how can they be used? We realized that we were guilty of aligning ourselves with the same misconceptions that so

many others still have in this so-called era of openness, of free discussion, and of what seems to be a proliferation of sex information. Actually, we do not even know what we don't yet know. The vast amount of information that has been produced by us and others in the last twenty years has not replaced all the myth and lore and personal experience (and individual perception of that personal experience) that primarily guides people in this field. The fact is that we unconsciously were supporting the idea that sex is separate and apart from all other aspects of human existence. We immediately took steps in response to our own realization and to the challenge of the health-care profession that there must be some implication to these facts or the fact-gathering essentially might be a waste of time. We needed to know how these facts worked for the health-care and counseling professions. As we set out to develop a methodology, we realized that it was the context in which sexuality was expressed that made the crucial difference. An individual's set of attitudes and values; conditioned, learned responses; experiential background; and beliefs and expectations had to be viewed as the matrix of the problem itself.

There are still too many people who think of sex as a separate piece of machinery rather than as a total system, interacting as part of a constellation of systems which "operate" the human body. When something goes wrong with this "piece of machinery", the reaction usually is one of two varieties. Either resignation: "The Lord giveth, and the Lord taketh away." Or, remove the failing machinery from consideration within the total person, fix it, put it back in, and expect it to work. This attitude is best demonstrated when people come and ask for a pill, a magic incantation, or some kind of scientific mumbo-jumbo to solve their distress. These people are usually surprised to find that specific sexual function is never the sole focus of the health care or methodology that tends to reverse the problem.

Early on we established a couple of definitions for ourselves to help communicate more easily the concepts and findings regarding human sexuality.

Masters

We define sex, or sexual function, as explicit sexual expression or activity: intercourse, masturbation, etc. We define sexuality as a dimension of one's personality, one's masculinity or one's femininity. For example, sexuality is expressed hundreds of times a day in how one thinks and in what one says. That which is explicitly sexual generally occurs in episodes of much less frequency.

Johnson

Let us elaborate briefly upon the ways in which some of our definitions and methodologies relate to the fragrance industry.

Many of the couples with whom we work clinically are alienated from one another because of sexual dissatisfaction or dysfunction. Alienation in this context means, more precisely, emotional apartness or separation. Some may also feel hostility, but more often they care for one another and have many common bonds in their lives which are sustained in spite of their impaired sexual relationship. In an effort to protect the commonly fragile balance in their relationship, however, they limit or destroy whatever real communication they may have had. It is this communication which clinicians must help restore in the course of reversing sexual problems.

We soon learned we could not tell couples simply what they should do. A "recipe" is too inflexible to apply to everyone alike. It was obvious that a first step must be the realization of what sexual response really is—a natural experience. This usually required helping couples to discover how to go from doing nothing to doing something by way of physical (as well as verbal) communication. Quite accidentally we realized that the use of lotion—each applying it to the other—could provide a medium of exchange between them. For two scared or insecure people who have lost confidence in themselves or in their mutual sexual effectiveness, lotion could initiate intimacy with less pressure and thus become a bridge to communication. In this way it was first introduced as a small but sometimes crucial part of the early clinical methodology.

Subsequently, our friends at International Flavors and Fragrances became interested in some aspects of our basic research programs. They felt there might indeed be some implication for the fragrance industry in these studies and in others similar to ours. They learned of our interest in the potential use of lotion and helped us by improving the characteristics of the medium. At the same time they introduced the idea of adding fragrance as an enhancement in attaining the communication levels which we sought for the sexually distressed couples.

So our peripheral involvement with your field has not been only in pheromone research. Although our early introduction of fragrance into our research and clinical studies was rather naive and must have disappointed IFF to some extent as we continued until more recently to place other priorities ahead of olfactory considerations, they graciously kept us aware of this particular facet of human experience and never let us forget that sexuality and fragrance relate on many levels.

Masters

It becomes quite apparent that our most basic common professional interest is in the act of communication.

In human sexual function, there are three basic reasons for "communication". Obviously, the first is propagation of the species. The fascinating thing is that in our conception-control society not one-tenth of one percent of the time are we actually involved in sexual activity or are

we interested in or devoting our efforts consciously toward conception. The second purpose of sexual activity is the release of sexual tension. The third dimension of sexual function, what we consider a real bonus from this natural function, derives from its potential as one of the best means of communication within a committed relationship.

I would like to finish with a true story that has to do with communication, or the lack of it, between a committed couple. About twenty years ago, in 1955, an attractive young man graduated from a major university in the Midwest. In 1956, his future wife also graduated, and they were married shortly thereafter. These two people were totally devoted to each other and decided they wanted children badly. In 1961, they were referred to us because of their inability to conceive. They had great communication; they expressed their concerns; they talked freely; but they did not conceive.

To go back a bit, starting in 1946, we realized that the only thing necessary to help a significant percentage of people conceive was simply to give them information. We only saw such couples after they had been trying to conceive for at least a year. For 25 years, we spent the first visit telling the couples three things: how to have intercourse, when to have intercourse, and how frequently to have intercourse in order to conceive. Then we sent them home to try for three months. One out of every eight couples, 8.23 to be exact, conceived in three months time, simply having been taught how, when, and how frequently.

Well, we sat down to talk to this couple. After we had discussed the weather, I turned to Mrs. Smith and said, "Perhaps you had best tell me how frequently you and your husband have intercourse?" By 1961, I had long since learned you never ask the husband that question because you get such incredible answers. Mrs. Smith looked at me, and her face got a little pink. She looked at the floor, and she looked at her husband. He was looking out the window—he was not about to help her. She said, "Well, Dr. Masters, do you mean sleep together?" I had heard that term, and I said, "Yes, yes, of course, Mrs. Smith." She said, "Doctor, we have wanted babies so very badly that we have slept together every night since we've been married." I said, "Mrs. Smith, every night?" She said, "Doctor, I promise you we haven't missed a night," and her husband nodded his head. Well, I was impressed. I was doing 365 by 6, and that was an impressive number. So I said, "Mrs. Smith, I can certainly tell you unequivocally that we know one of the difficulties that you are having and that is your husband has a very low sperm count." "Doctor, doctor," she said, "how did you learn that so rapidly?" I said, "Mrs. Smith, it takes the average fertile male from 30 to 40 hours to return his sperm count to normal after he ejaculates. Do you suppose you could sleep together every other night during your fertile period?" Well, she did not know what her fertile

period was, and we talked about that. They went home and slept together every other night during her fertile period. When they came back at the end of three months, it was obvious that this was not a couple that we had talked into pregnancy.

To give you some idea of their backgrounds, these two people had married upon her graduation. They had spent their summers getting their MA's in education. They were both teaching high school in southern Illinois. At this point, they had been trying to conceive for five years.

When they returned and she was not pregnant, we did all the physical examinations and laboratory tests. In the course of her physical examination, I was doing a pelvic and encountered a completely intact hymen. It occurred to me that we were not communicating. (Again, I tell you this is a true story.) So we went back to talk a little further. And, in truth, these two people really thought that in order to conceive the only thing they had to do was sleep together. And they had done so for almost six years.

I know you find this awfully hard to accept. But if you think that is difficult, then let me really confound you. Imagine the statistical impossibility of these two people finding each other! Psychiatrists would say that they had to.

Johnson

Our society has not yet produced a generation with a high percentage of people who realistically conceptualize the nature of their own sexuality. On a weekly basis we see people with sexual misconceptions, perhaps not as dramatic or as impossible-sounding as this one, but potentially as debilitating.

In our early work with olfaction, in a most unsophisticated way, we were seeking to define the origin of preferences related to fragrance and learn how much might be instinctual or a part of a natural signal system. We found that preferences can result from conditioned response to experience and other learning opportunities. But we do not anticipate being able to separate learned preferences from any potential basis for instinctual preference.

The fact remains that odors and fragrances can provoke both positive and negative responses. You in your role as purveyors of fragrance can build in many positive responses to a particular product. We, as a society, tend to like and learn from things that are presented to us pleasantly, excitingly, or in other ways appealing. However, there remains the reality that a fragrance most popular with a large number of people can turn off completely a certain number of others. Each individual is unique, with a set of feelings, attitudes, values, experiences and expectations like no other. All these factors affect the way fragrance is perceived.

So that remains your dilemma. And it remains our commitment to learn more so that each of us, for our own purposes, can really understand the role that olfaction plays in the total of human existence.