

TALES AND TRAILS



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OYSTER BREEDING CHALLENGED BY NEW TECHNOLOGY

Common oyster industry practice is to mix eggs and sperm together in tanks and harvest the resulting animal growth. The oysters you get may taste good, but that production method can result in loss of important genetic variation, according to Animal Science research geneticist Dennis Hedgecock.

Breeding oysters to preserve and improve upon desirable genetic traits presents a major challenge to the emerging field of aquaculture. Methods commonly practiced in livestock breeding are now being applied by researchers to aquaculture species.

In the molluscan culture lab at the Bodega Bay Marine facility, an air pump forces oxygen through yards of clear tubing, releasing a flow of bubbles into rows of suspended, transparent plastic bags. The setup resembles drip irrigation, except that each bag contains sea water and specially cultivated algae to nurture millions of minuscule oyster eggs. Under a microscope, malformed eggs are most easily detectable when they lack the round symmetry of normal eggs. Hedgecock is developing an oyster brood stock where the parentage of all animals is known.

With funding support from the USDA's Western Regional Aquaculture Consortium (WRAC) in collaboration with industry and research personnel from the Universities of Oregon and Washington, three sets of eggs were bred with eight sperm types yielding a total of nearly 200 families. Starch gel electrophoresis of biochemical markers, known as allozymes, was used to confirm parentage of all families which are now being



HEDGECOCK WITH MOLLUSCAN CULTURE TANK

grown to adult size on commercial oyster grounds in Washington and California. Data on size and stage of sexual maturity are being collected at harvest in order to estimate genetic and environmental components of variation and relationships among these traits.

In another study recently completed by Hedgecock and his graduate student, Fred Sly, two hatchery-propagated stocks of Pacific oysters were compared to the offspring of a natural population which had been isolated three generations earlier. Hedgecock and Sly determined that the hatchery stocks that had been propagated by mass spawning of several hundred oysters, came from only 9 parents, in contrast to 41 parents in the natural population families. In other words, only a small proportion of possible parents actually contributed progeny each

generation. The two hatchery stocks had undergone considerable random genetic divergence from each other and from their wild progenitors and inbreeding was the result.

Other current research in Dr. Hedgecock's laboratory centers on the reason for the limited number of parents in hatchery stocks. Females are each capable of producing up to 100 million eggs at a time. However, no progeny survive in many of these families, whereas other families have very large numbers of survivors. Dr. Hedgecock hypothesizes that this disparity in reproductive success is also large in natural populations of marine organisms and is thus a major factor in their adaptation and evolution. He is developing new molecular methods for examining genetic relationships between adult and larval populations of oysters, both in nature and in aquaculture, and is using a polymerase chain reaction technique to identify DNA sequences.

Superior production-related traits, such as a rapid growth rate and early sexual maturation, are important commercially to maximize the volume of yield. Hedgecock states, "Pedigreeing, or controlled breeding, is difficult and will necessitate changes in commercial husbandry practices. In order to make progress towards domestication, industry must cease mass spawning, mixing of spawns at all phases of growout, and haphazard selecting of brood stock."

COMPUTER MODELS AID ANIMAL PRODUCTION MANAGEMENT

In days gone by, when the time came to cull or increase a herd, a rancher would probably use the "eyeball technique" to decide which animals to keep or purchase and which to sell. In today's highly competitive industry, however, that method is no longer economically practical. Dr. Jim Oltjen, the Department's newest Cooperative Extension specialist, is committed to helping ranchers and producers make such management decisions with more sophisticated techniques.

Oltjen is currently integrating a cowherd computer model with a program called CALEX (California Expert System), an agricultural management advisory system. An animal computer model gives the user the capability to apply laboratory research findings to production systems for rapid quantitative analysis. Data such as age, calving history, calf weights, physical condition and other information about individual animals can be entered into the program. On the basis of that information, the system will calculate the present and projected value of each

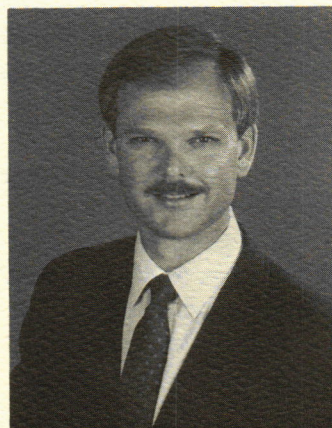
animal, recommend whether to keep or cull it, show the ranking of the animal within the herd, and give a narrative summary of the rationale behind the decisions. Such a program will enable a rancher to project the future performance of the herd in a variety of management areas such as breeding, feed programs and lactation.

U.C. Davis has a significant edge in the development of animal models, maintains Oltjen. We have "the best lactation model in the world," developed and refined by Dr. Lee Baldwin, which will be used as a springboard for creating other models designed to help producers remain competitive in the food animal production field. Dr. Oltjen anticipates that the lactation model will be available for use by dairy producers within two to four years. The model will make it possible to evaluate the effects of present and future feeding and management strategies on lactation curves and predict future returns from milk production.

Another potential model application will integrate computer ration programs, which are currently in use, with growth and energetic models. With such a model a producer will be able to make informed decisions not only about such issues as what to feed his herd, but whether pasture, feedlot or calculated periods of each will be more advantageous, and how to use the best combination of implants and feed additives.

Although CALEX is still in the testing and development stage, Oltjen expects to integrate it with COW-BOSS, an existing data base program for beef herd management, in the near future. This integration will expand the data base from which CALEX can draw, thereby extending the usefulness of the model.

Dr. Oltjen is part of the new computerized era of extension specialists. He brings not only hands-on experience with food animal production, but also extensive



NEW
CE SPECIALIST
JIM OLTJEN

academic and research credentials to his new position of Animal Management Systems Specialist. Dr. Oltjen comes to U.C. Davis from an associate professor position at Oklahoma State University, but is not new to the Davis campus; he completed his PhD in Nutrition here in 1983, and subsequently worked as a Programming Consultant for Cooperative Extension.

In addition to developing animal models for industry application and taking them to the field, Dr. Oltjen's responsibilities at UCD will include work with Integrated Resource Management systems with other departments, a series of lectures for the graduate level course entitled "Models in Agriculture and Nutrition," and work on the National Research Council Nutrient Input-Output Subcommittee publication.

ANIMAL CARE PRACTICE GUIDELINES DEVELOPED

The food animal industry has come under heavy fire in recent years for a variety of practices which are often perceived as being detrimental to the health and well-being of the animals. A consumer public that is increasingly detached from agricultural processes is particularly vulnerable to misinformation and misunderstanding. Now, producers and extension advisors have begun to look more closely at many practices which have been taken for granted and ask what is necessary to maintain the well-being and health of their livestock.

In response to such queries, Ken Ellis, an Extension Animal Scientist at U.C. Davis, has spearheaded a cooperative project to develop guidelines for animal care for beef, swine and sheep. "I was getting a number of calls from livestock advisors whose clientele had concerns about animal welfare issues," explained Ellis. "With the increasing interest and concern in our society about how food animals are raised, it seemed important to address the issue directly."

Last fall, an exploratory meeting was held among extension veterinarians and advisors, industry representatives, and veterinarians in private practice. During that session the attendees discussed the feasibility of preparing such guidelines, reviewed materials on animal care and welfare that have been published in other regions of the U.S. and in Europe, and explored the most useful format for presenting the guidelines. With unanimous agreement that it was both timely and essential to

undertake such a project, three subcommittees were formed to draft comprehensive listings and descriptions of practices and techniques recognized by the University of California as related to the health, well-being and care of food animals. Each committee was composed of extension advisors, industry representatives and practicing veterinarians who worked with the species in the field.

"A major challenge in writing these guidelines," said Ellis, "is that California is a very diverse state in terms of terrain and climatic conditions. The information must be written in such a manner as to encompass the diversity and breadth required for different management needs at different times in different regions." In addition to standard care practices, some controversial practices such as castrating, ear-tagging and branding will be addressed as to why they are used and how best to perform them.

The guidelines are intended primarily for use by Cooperative Extension advisors, although Ellis anticipates that they will prove of value to others as well. Although the information is not intended to be regulatory in nature, he expects that the guidelines may be of use to such groups as industry organizations, and local and state decision-makers faced with public pressure to ensure animal welfare. "Industry support for the project has been very strong," observed Ellis. "Critics of the food animal industry often overlook the fact that producers have a genuine interest in the well-being of their livestock; mistreating or neglecting one's animals just doesn't make good economic sense, but in our growing urban society livestock operations are increasingly under public scrutiny. These guidelines should help us to look more closely at our overall production practices."

The guidelines are still in draft stage, but Ellis expects all three to be published within this fiscal year. The swine listings are expected to be out first because there is less geographic diversity in the areas where swine are raised. Before publication the drafts will be reviewed extensively; part of the process will be to take them to wider review beyond the university and the industry.

GATENBY APPOINTED TO SR-CRSP POST IN INDONESIA

Dr. Ruth Gatenby was appointed September 1, 1990 as Assistant Research Animal Scientist in the UCD Animal Science Department to work on the Small Ruminant Program (SR-CRSP) in Indonesia. The objectives of this research program, which is funded by the US Agency for International Development (USAID), are to develop in-

formation related to sheep production in conjunction with estate tree crops such as rubber, oil palm and coconut.

Millions of acres of such crops are grown in countries like Indonesia, Malaysia and the Philippines, where sheep grazing can contribute increased income, diversification, and reduction in the use of herbicides. The Indonesia SR-CRSP project, nicknamed "Sheep under Rubber," began in 1984 and will be substantially expanded in a new 5-year phase just beginning. UCD has responsibility for the breeding and management components of the program. This production system is relatively new in the region and has stimulated much interest in the research.

Dr. Gatenby will be the lead animal scientist on the program, which also involves work in forages, nutrition, parasitology, economics and related areas. She is widely experienced in the animal husbandry of developing nations. After completing her Ph.D. degree at the University of Nottingham in 1979, she worked as a consultant in Togo, Ethiopia and Trinidad, and on a prior assignment with a USAID project in Indonesia. For the past three years Dr. Gatenby has been a livestock specialist at the Pakhribas Agricultural Centre in Nepal. She is the author of the book "Sheep Production in the Tropics and Subtropics."

Glenn Spurlock: A Sheepman Remembered

Retired Cooperative Extension Specialist and former UCD Animal Science professor and alumni, Glenn Spurlock, died July 24 at his home near Anchor Bay in Mendocino County. Spurlock, 76, was widely recognized for his contribution to the sheep and goat industries and was awarded The Order of the Golden Fleece from the California Woolgrowers' Association, the association's highest honor. Although retired, Glenn Spurlock continued to hand-write letters from his home to followers world-wide who wrote him requesting his expertise on sheep and goat production. His publications from twenty years ago are still in demand today.

Spurlock earned his Ph.D. in entomology and parasitology after doing graduate work at UC Berkeley and UC Davis campuses. After finishing school, he managed a sheep operation in California and Arizona for 15 years.

He later became a member of the Animal Science teaching faculty before transferring to Cooperative Extension.

Glenn Spurlock secured the close friendship of many Animal Science faculty and Cooperative Extension specialists who remember him as "a versatile man" of "grit and talent." Some of his poems are a part of the Animal Science department's permanent collection of valued historical items. The following is one selection:

Rosendo's Saddle

*A Master saddler shaped my wooden frame
And leather tight the day that I was born;
But now I'm old and know my time is past,
I've lost the rawhide rope tied close beside my horn.*

*Once long ago and for a few short days
I shone with wax, my leather bright and smart;
How good I felt cinched tightly on that bay,
The pride and joy of one young rider's heart.*

*Looking back now I can see Rosendo's hand
Throw out the loop that caught the big roan steer;
The young horse fell, I had to take the blow--
My cantle banged a rock but kept my rider clear.*

*Since that baptismal knock I've bathed in sweat and
tears,
Been torn by brush and tree, by snag and thorn;
I've seen the dust and storms of many trails,
A wild cow gored my horse's flank--just missed me with
a horn.*

*My weakened strings can't hold the meat and bread
That in the mornings used to dangle there;
My double cinch still hangs but would not hold--
The heave of flanks and chest would make it tear.*

*My pommel and my horn are still quite strong,
They've stood the strain of dallies--tight strung rope.
I'm proud of all the beef that I've helped raise,
But now I hang neglected--without hope.*

*The past is gone but I still linger on
Till some young boy walks by with tousled hair,
And turns to ask the father by his side--
"Say Dad, what is that hanging there?"*

ALUMNI KEY SUPPORTERS OF DEPARTMENT AND COLLEGE

Sharp, Borrer, Rosenberg and Jewetts Presented with Awards of Distinction

Leroy B. Sharp, Jr. of Tulare, William F. Borrer of Gerber, Margaret B. Rosenberg of San Ardo, and Alyce and Lindsay Jewett of McArthur, California were each presented with the Award of Distinction by the UCD College of Agricultural and Environmental Sciences (CAES) at a ceremony on September 13, 1990. The Award of Distinction is the highest recognition presented by CAES to honor "individuals whose contributions and achievements have enriched the College's image and reputation and enhanced its ability to serve the public."

Roy Sharp, Jr. completed his B.S. in Animal Science in 1950. He is a livestock producer in Tulare and a recognized leader in the California and national pork industry. He has served as President of the California Pork Producers Association and on the National Pork Producers Council (NPPC), and is currently a member of the National Pork Board which administers funds collected under the Pork Research and Education Act. A pioneer in designing and building energy-efficient, environmentally-sensitive swine operations, Roy actively works to share his expertise with livestock producers around the world. He is a strong supporter of cooperative extension and has served on the review committee for animal science extension programs statewide.

Bill Borrer, owner of the Tehama Angus Ranch, graduated from UC Davis in 1955 with a degree in Animal Science. He soon became an acknowledged leader in the genetic improvement of beef cattle and has been a long-time member of the California Beef Cattle Improvement Association. Borrer has the largest herd of purebred Angus cattle in California, which is recognized as a premier herd in the U.S. for high quality, performance-tested cattle. He frequently makes his herd available to UCD for research and education programs in animal science, and is a strong advocate of secondary school agricultural education.

Margaret B. Rosenberg received the award in appreciation for her creation of the Walter Rosenberg Endowment Fund. She and her husband Walter operated a 20,000 acre ranch in Monterey County and frequently collaborated with Cooperative Extension on research and educational projects. Margaret endowed the fund in 1980 after Walter's death, to support research in animal science, agronomy, vegetable crops and agricultural engineering. Several Animal Science students have been assisted by the Fund this year.

Alyce and Lindsay Jewett both earned degrees in animal husbandry from UCD. Like Borrer, they have actively supported high school agricultural education and have established funds that have so far made educational loans to more than 2,100 UCD students. Mrs. Jewett has the distinction of being the first woman to graduate in animal husbandry from what was then (1928) the University Farm School. She was also the second person from the college of agriculture to be elected to Phi Beta Kappa, the national academic honor society. Mrs. Jewett taught agricultural economics at UC Davis from 1934-36, and served as Public Affairs Officer for UCD in 1961. Mr. & Mrs. Jewett have also been active in support and leadership to alumni programs.

The Animal Science Department members are acutely aware of how much the contributions and interest of these and other alumni enhance our teaching, research and outreach missions. We extend our heartfelt thanks for that support and encouragement which enables us to maintain the highest standards of excellence in all our endeavors.

ANIMAL SCIENCE MEMORIAL FUND UNDER DIRECTION OF BILL WEIR

Emeritus professor William "Bill" Weir returned to the Animal Science department 7/1/90. Bill joined the Department in 1948, and became a well-known teacher and sheep nutrition specialist for the next 25 years. He served as Dean of Students from 1957-63, and as Chief of Party for the UC-Chile program 1968-70. His service to the sheep industry was recognized by presentation of the California Wool Growers Association Golden Fleece Award in 1973. In that same year he became Chair of the Department of Nutrition, a position he held for eight years. Subsequently, he served as Associate Director of the Small Ruminant CRSP, an international research program managed by UCD, and Associate Dean for International Programs, a position from which he retired this year.

Weir will undertake the management of the Animal Science Memorial Fund as Chair of the Memorial Fund Committee. This fund supplements the department's teaching and research endeavors and each year provides support for many student activities. Former Animal Science alumni, extension advisors, ranchers, dairymen and other industry leaders are the primary contributors to this fund, which honors people who have made noteworthy contributions to California's livestock industries.

KENNETH WAGNON AND GRANVILLE HUTTON:

THE PASSING OF RANGE AND DAIRY CATTLE LEADERS

Kenneth A. Wagon, retired UCD specialist in animal science since 1983, died September 20, 1990 in Albuquerque, New Mexico. He was 83 years old. He worked 37 years at UC Davis doing range cattle research with scientists and ranchers at the San Joaquin Experimental Range. He was an expert in the inter-relationship of range cattle and range management. Wagon and Reuben Albaugh published the book "Beef Cattle Production" in 1960.

Granville Hutton, dairy farm advisor of San Joaquin County, died April 21, 1990 at the age of 64. Granville, a UCD Animal Science graduate, was dedicated to dairy farming and to Cooperative Extension. He is widely known for his published research information on dairy milking equipment, least cost rations, and pond designs. Over the years he continued to advance his technical expertise, becoming proficient with computers and developing many dairy programs.

ERIC BRADFORD IS NEW CHAIR OF ANIMAL SCIENCE;

ED PRICE IS VICE CHAIR

Professor Eric Bradford was appointed Chair of Animal Science effective 9/1/90. Bradford faces the difficult challenge of providing leadership at a time when the department has suffered a major budgetary reduction. He is attempting to preserve important existing functions while minimizing staff layoffs. The University's retirement incentive program increases the prospect for voluntary staff reductions, but carries with it the uncertainty of predicting which valuable staff will elect to participate in the plan and leave critical tasks to be covered by a smaller remaining staff. According to Dr. Bradford, "The scope of budget reductions affects all aspects of the department's programs, including teaching and extension as well as research."

Bradford is not a novice at managing a department, having served as Chair of the department from 1973 to 1978. He has been a member of the Animal Science faculty since 1957 and has worked with sheep as the major focus of his research. He became involved with the Small Ruminant Cooperative Research Service Project (SR-

CRSP) and continues to engage in sheep breeding and genetics research.

Professor Ed Price was appointed to the new position as Vice-Chair of Animal Science and will be particularly involved in such important functions as academic merits and promotions, facilities planning, undergraduate course review and providing leadership in animal welfare issues.

IAN GARNETT LEADS MASTER'S OF ANIMAL SCIENCE AND MANAGEMENT PROGRAM

The new professional Master's program, jointly offered by the department of Animal Science and the Graduate School of Management, has become a reality with the appointment of Dr. Ian Garnett as Director. Garnett obtained his B.S. degree in Canada, received his Ph.D. in animal breeding at the University of Edinburgh, and has over fifteen years of management experience in one of the largest corporations in the animal industries, Cargill, Incorporated, where he rose to be a project general manager in the Swine Products Division.

The M.A.S.M. program has many distinctive features that correspond to the findings of the recent alumni survey. That survey indicated that 60 percent of the Animal Science alumni have taken additional graduate work following their baccalaureate. Some of the program's unique features include the core courses offered in the School of Management, and internships where first-hand experience can be gained by combining a background in animal science and management. Graduates of the program should be well prepared for careers in management in the many animal industries.

For more information about the program, please contact Dr. Ian Garnett at the Department of Animal Science, telephone (916) 752-0575.



NEW MASM DIRECTOR IAN GARNETT

ANIMAL SCIENCE HOSTS WOOLGROWERS CONVENTION

UCD Animal Science Department hosted the California Wool Growers Association convention on September 7, 1990. In addition to a delicious lamb barbecue luncheon served at the Putah Creek Lodge picnic grounds, approximately 120 attendees were treated to a grand tour of some of the UCD facilities important to the sheep industry. The tour began at the Sheep Barn with presentations and demonstrations on pregnancy diagnosis, serving capacity and out-of-season breeding. The group next were shown the California Veterinary Diagnostic Laboratory and learned about the ELISA blood test for the ram epididymitis organism and the diagnostic test for Scrapie. The tour concluded at the Cole Facility meat lab and research areas with discussions of pasture vs. feedlot finishing for lambs, Spider Lamb Syndrome and embryo collection/transfer research. Dr. Eric Bradford, new department chair, and Ken Ellis, Extension Animal Scientist, who planned and coordinated the program, reported that the Wool Growers who attended the event had high praise both for the afternoon's program and for the department's involvement in research which contributes to improving the sheep industry.

BRADFORD AWARDED "GOLDEN FLEECE" BY CWGA

Dr. Eric Bradford, Animal Science Department Chair, was honored with the California Wool Growers' coveted "Golden Fleece" award in recognition of his dedication and contributions to the California sheep industry. The award was presented by Dr. John Glenn, UCD Extension Veterinarian, at the closing banquet of the 130th annual CWGA Convention in Sacramento on September 8, 1990. In his remarks Dr. Glenn observed that Dr. Bradford's vision and research had paved the way for practical genetic selection techniques to increase reproductive efficiency via multiple births and early lambing, and to increase growth. Dr. Bradford was an advocate of these techniques long before the industry appreciated their importance. However, his research-based recommendations are now recognized as vital for the economic survival of commercial sheep operations.

FACULTY MEMBERS HONORED

Two Animal Science faculty members were honored this past year. Dr. Lee Baldwin was presented with the Distinguished Alumni Award from the alumni association

of the University of Connecticut for outstanding achievement. Dr. Baldwin received his B.S. from the University of Connecticut in 1957 in the field of Animal Industries.

Dr. Graham Gall was awarded a USDA Certificate of Appreciation for his service as Topic Manager for the Aquaculture Program of the Small Business Innovation Research Office. Dr. Gall worked with the FY 1991 panel to evaluate proposals submitted to the program.

GRAD STUDENTS WIN NATIONAL AND INTERNATIONAL HONORS

Three graduate students in Animal Science have captured high honors in national and international competitions this year. **Leslie MacLaren**, a doctoral candidate in Physiology, was awarded 2nd Place in the International Embryo Transfer Society Graduate Student Competition for her presentation and abstract on "The antibody responses of ewes to chimeric conceptuses enclosed in ovine trophoblast." Ms. MacLaren expects to receive her Ph.D. this December, after which she will "vacation for at least a month." She also is weighing the merits of two postdoc positions in Canada.

Alison Van Eenennaam, who graduated this past August with an M.S. in Animal Science, took 1st Place in the American Dairy Science Association Graduate Student Research Paper Competition. Her presentation was based on her Master's work with Dr. Juan Medrano on genetic variation in bovine milk proteins. Ms. Van Eenennaam has been selected to fill a cooperative extension dairy and livestock advisor position in San Joaquin and Sacramento Counties.

Joanne Knapp, who will be awarded her Ph.D. in Nutrition in December 1990, won the Purina Graduate Fellowship for the second year in a row. This year the award was made for her proposed study on "Ketosis in Dairy Cattle." Ms. Knapp declined the stipend for the award saying "I'm finishing my work ahead of schedule and don't need the money; I still have the honor." She will begin a year-long postdoc position with Dr. Lee Baldwin in January 1991, continuing her study of dairy cattle nutrition. The Purina Fellowship is awarded to only five students nationwide each year.

Four New Graduate Courses Extend Teaching Scope

Courses in genetic engineering of agricultural livestock, advanced concepts of cellular growth regulation, mathematical models, and grant writing techniques have been added to the Animal Science curriculum.

Associate Professor Jim Murray teaches the new Animal Genetics 211 course on the application of genetic engineering of animals in agriculture. This course discusses methods for producing transgenic (genetically-engineered) animals, what is required to express these new genes in an animal and reviews current world-wide research on applying this new technology to improve animal production. Future areas of potential applications of genetic engineering in animal agriculture are also explored by the students. A mixture of lectures, discussions and student presentations comprises this 2-unit course that began spring 1990.

Animal Science 215, a class on advanced growth regulation, has a goal of introducing students to various growth concepts including control mechanisms at the cel-

lular and whole organism levels. It relates overall development to specific subcellular actions. Additional emphasis is placed on scientific writing skills. Dr. Anita Oberbauer began teaching the 3-unit course in the fall of 1990.

Assistant Professor James Fadel will teach Animal Science 206, models in agriculture and nutrition, every other year beginning winter quarter, 1991. The 3-unit course will include basic model building principles and techniques for developing and utilizing statistical and systems simulation models; experimental design considerations for non-linear systems; and the application of optimization models. Progressive computer software will be used in the laboratory.

Animal Science 216, a 1-unit course to be taught in winter quarter, 1991 by Assistant Professor Anita Oberbauer, will familiarize students with the grant writing process and review procedure. Mock grant applications written in Dr. Oberbauer's new Animal Science 215 class will be sent to external reviewers and their comments incorporated into the explanation of the revision process.

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