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Characteristics of a world-class zoo or aquarium in the 21st century

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At the start of the 21st century modern zoos and aquariums are expected to contribute to the survival of the species they display, to educate the public, and to maintain the physical and psychological well-being of the animals in their care. For the future, however, zoos and aquariums will have to be extraordinary in both quality and accomplishments. In this article the characteristics of a world-class zoo or aquarium are described, ranging from organizational structure and philosophy, and staff recruitment and training, to animal care and husbandry, research, conservation, education and exhibit design. The importance of inter-institutional co-operation, technology, government affairs, marketing and development, and public relations are also discussed. In the future managers will have to take a more holistic approach to all these characteristics in order to achieve their core mission without losing sight of the primary objectives of the zoo or aquarium.

Key-words: conservation, co-operation, husbandry, organizational structure, recruitment, technology, 21st century, world class, zoo and aquarium associations

Many authors have examined various trends and speculated about the future of zoological parks and aquariums (e.g. Caras, 1972; Cherfas, 1984; Wheeler, 1985; Croke, 1997; Kelly, 1997; Conway,

1999a; Hutchins, this volume). At the start of the 21st century, expectations for modern zoological institutions are high. Among other things, the best modern zoos and aquariums are now expected to contribute to the survival of the species they display, to educate the public and to maintain the physical and psychological well-being of the animals in their care (Shepherdson, 1998; Conway, 1999a; see also articles in Section 1, this volume). The zoo and aquarium profession has made considerable strides over the past two decades. Time marches on, however, and those institutions considered to be outstanding today could become mediocre tomorrow if they fail to keep up with the accelerating pace of professional and societal change (Ehrenfeld, 1995). The profession is at a critical historical juncture and in the coming century, a 'world-class' zoo or aquarium will have to be extraordinary in both quality and accomplishments. Many of the areas in which they will be expected to excel are fairly evident, such

as exhibit design, animal management, research, conservation and education (Conway, 1999a; Conway & Hutchins, 2001; Hutchins, this volume). However, there are many other relevant factors that must be taken into consideration and acted upon, including: organizational structure and philosophy; inter-institutional co-operation; technological capabilities; employee recruitment, training and retention; marketing and development; government affairs; public relations.

In this article, some of the expectations of a world-class zoo or aquarium of the 21st century are summarized. In defining these characteristics, we aim to provide a metaphorical 'road map' for a new generation of zoo and aquarium directors, governing boards and staff.

CHARACTERISTICS

Organizational structure and philosophy

The fortunes of zoos and aquariums of the past typically rose or fell on the passion, knowledge and political acumen of a single charismatic leader: the institutional director. The world-class zoo of the 21st century will also require intelligent, decisive, innovative leaders in order to be successful. However, such leaders will understand what it means to be good managers, including how to recruit and hire highly qualified staff and delegate tasks (Simmons, 2000). These institutions will have a less hierarchical structure; one that draws upon the strengths of all levels of the organization. They will also know when they do not have the appropriate expertise to complete a particular task or solve a particular problem and bring in outside help (i.e. outsource) when needed (Lang, 2000). Team approaches to problem solving will replace top-down, hierarchical decision making (Jacob, 1993) and individuals will be hired as much for their ability to work with and act as mentors to others as for their particular technical skills (Coe & Beattie, 1998; Rabb, 2001).

The trend towards privatization of zoos and aquariums (AZA, 1999b) will continue, although many will retain private-public partnerships with the cities or states in which they are located. Freedom from the sometimes stifling influences of government administrative bureaucracy will allow modern zoos and aquariums to: (1) recruit and hire the best available personnel, (2) remove unproductive personnel more easily, (3) speed up decision-making processes, (4) take more risks and (6) be less subject to the vagaries of government funding and political cycles (Anderson, 1994; Baker, 1994). This does not mean that world-class zoos of the 21st century will never come from the ranks of government-run institutions, only that they may be less likely to do so. Enlightened government leadership could create the right conditions for a modern zoological institution to flourish (e.g. Roberts, 1995), but it would mean giving up many cherished and politically popular notions, such as job protection, minimum risk taking and an over-dependency on public funding of core operations (Anderson, 1994; Baker, 1994).

It should be noted that privatization also has many downsides, such as the possibility that the core mission of the institution might become secondary to public relations and fundraising. Those institutions that privatize must take great care to balance their marketing and development activities with their efforts in conservation, science and education. This may be particularly true when a new director comes from outside the profession and, at least initially, has no immediate knowledge of the intricacies of managing a modern zoological institution. The pitfalls of modern zoo and aquarium management are numerous and a director may lose their job not only as a result of gross fiscal or political mismanagement but also because of ethical miscalculation. It is therefore critical that modern zoo and aquarium directors, regardless of their backgrounds, be aware of the many sensi-

tive issues that might confront them, especially with regard to animal care, breeding, acquisition and disposition (Hutchins & Fascione, 1991; Koontz, 1995; AZA, 1999a,b, 2000b; Lindburg, 1999). In today's media-driven society, even a brief lack of vigilance can result in serious consequences.

Employee recruitment, training and retention The zoological profession is becoming increasingly more sophisticated and its challenges more complex. Thus, in order to accomplish all its diverse goals, a world-class zoo or aquarium must have innovative and well-trained personnel who understand the vision and goals of a modern zoological institution, and have the skills and motivation to implement them. World-class institutions will make staff recruitment, development and retention a priority at all levels, including offering continuing education and formal training opportunities (e.g. Koontz & Hutchins, 1990; Kelly, 1997; Read, 1998).

Knowledge is power and, because of the rate at which we are accumulating new information, the next century will usher in an era of extreme specialization. Zoo and aquarium staff will include professional scientists and conservationists who contribute to our knowledge about wildlife and make demonstrable contributions to wildlife and habitat conservation worldwide (Hutchins, 1999). Curatorial staff with both advanced academic training and practical experience will be employed so they can continually integrate scientific advancements and new technologies into animal management protocols (Hutchins, this volume). Skilled educators will be recruited aggressively, as the importance of quality educational outreach programmes is further recognized and valued (Delapa, 1994; Andersen, this volume). Everyone, from maintenance workers or seasonal employees to highly skilled keepers, curators, scientists, educators and administrators, will have at least a basic understanding of the institution's mission

and be able to articulate it to visitors (Groff, 1998). World-class organizations will value all kinds of diversity and seek to include a wide variety of individuals on their staff (Mackey, 1995).

Exceptional zoological institutions will use progressive personnel-management practices designed to empower employees and increase their output and contributions to the organization while, at the same time, ensuring their accountability and performance. In short, they will become 'learning institutions'. Learning institutions value knowledge and a diversity of perspectives and, as a result, are more likely to anticipate problems, inspire new innovations or adapt to new situations (Senge, 1990; Senge *et al.*, 1994). The stodgy zoo or aquarium of the past, which was resistant to change, conservative in outlook and averse to risk, will not be able to survive in the fast-paced, interconnected world of the new millennium.

As the need for highly skilled personnel is recognized, pay scales for zoo and aquarium employees are also likely to increase. Performance expectations and accountability will also increase accordingly, as modern zoos and aquariums adopt performance-based evaluation procedures. Managers and personnel will agree on the tasks to be accomplished and annual performance evaluations will be based on whether or not the work was completed. Pay raises will be based on performance and consistent lack of achievement will be grounds for dismissal. World-class zoos and aquariums will be able to retain productive, talented employees for longer periods of time. This will occur not only because compensation is reasonable and competitive, the work-environment fair and the tasks interesting and challenging, but also because both the institution and its employees are genuinely committed to the shared goal of wildlife conservation (Arca, 1996; Hutchins, 1999; Conway & Hutchins, 2001). In today's competitive job market, compensation is not the primary motivation for remaining

in a particular position. Individuals want to know that they have some measure of control over their work environment and that they are doing something personally satisfying and worthwhile. In short, zoo and aquarium staff should not perceive their work as a job but as 'an opportunity' (Pomerantz, 2000).

Inter-institutional co-operation Contemporary and future zoos and aquariums can no longer afford to be isolationists. In order for a zoo or aquarium to be highly regarded, it must be accredited by and active in its national and/or regional zoo and aquarium association. Membership helps ensure that the institution is part of a larger, co-operative whole and that it adheres to the highest industry standards. As part of this collective, a world-class zoo or aquarium will participate fully in regional co-operative breeding programmes [e.g. Species Survival Plans (SSPs), European Endangered Species Programmes (EEPs)] and regional collection plans designed to sustain genetically diverse, demographically stable, viable captive populations within the total space available (Wiese & Hutchins, 1994; Hutchins *et al.*, 1995; Smith & Allard 1999). They will also adhere to the highest legal, ethical and professional standards in the care and treatment of captive wildlife and in their dealings with colleagues and collaborators (e.g. AZA, 2000a).

Advanced institutions will share information and resources with other zoological institutions, with the goal of advancing the profession and multiplying their collective impact on education, conservation and science. For example, one of the biggest problems for zoo- and aquarium-based research is that sample sizes are often limited. Only through multi-institutional studies can zoos and aquariums obtain sample sizes that are large enough to be representative of the study population as a whole (Mellen *et al.*, 1998). Similarly, few individual zoos or aquariums can provide sole financial

support for large conservation projects or programmes. By sharing human and financial resources, and planning and acting co-operatively, modern zoological institutions will be able to magnify their impact on wildlife and habitat conservation in a cost-effective manner (Hutchins, 1999).

The need for inter-institutional co-operation is growing rapidly; thus, the coming decades could probably be classified as the 'age of the zoo and aquarium association'. Such organizations bring zoological professionals together with the goals of sharing information and resources, developing and enforcing basic standards of ethics and animal care, planning co-operatively, forming partnerships with other organizations and agencies with similar goals, and taking collective action in animal management, conservation, science and education. Associations also monitor industry trends, which is essential for anticipating future challenges (e.g. AZA, 1999b). In addition, they compile and report data on the collective impact of zoos and aquariums, which is critical for promoting the industry and documenting its societal relevance (e.g. AZA, 1999c). Furthermore, associations support legislation that benefits zoological institutions and promote the important work of their members in conservation, education and science through the national and international media. Finally, some associations have organized professional training programmes that assist in the professional development of their members.

Large national and regional associations will be pre-eminent in most cases because they are closest to and most familiar with the specific challenges faced by their members, including the various local, state or federal laws that regulate them and the regional and local politics that affect them (see also Cooper, this volume). However, the World Association of Zoos and Aquariums (WAZA, formerly the World Zoo Organization) will

also increase in importance as a forum for collective decision making and information exchange between various national and regional associations worldwide. To maximize its effectiveness, WAZA should become an association of national and regional associations. This will be particularly true as the need for global co-operation and information and technology exchange increases (Wemmer *et al.*, 1990).

World-class zoos and aquariums will recognize that membership and participation in association business brings substantial, measurable benefits. Institutions and individuals that fail to join or engage themselves in their professional association and the collective decision-making processes will be at a distinct disadvantage in the coming decades. As the importance of co-operative efforts is recognized, zoological institutions will no longer view staff contributions to association business as being 'voluntary', that is, something extra that is carried out in their own time. Rather, such contributions will be incorporated into institutional job descriptions, considered during annual staff performance reviews and perceived as a necessary and routine component of the professional activities of everyone.

Technological capabilities The world-class zoo and aquarium will be informed about and employ modern communication technologies to improve its networking and outreach capabilities. The scientific and business communities are dependent upon the Internet for research and communication (Butler *et al.*, 1996), and outstanding zoos and aquariums will be on the same level. Zoological professionals will find and disseminate information on the World Wide Web and enhance productivity, both within and beyond their own institution, through virtual work teams that thrive on e-mail discussions and Internet conferences (Koontz, 1996). Distance learning capabilities will be used to extend the educational reach of

zoos and aquariums directly into elementary, secondary, college and university classrooms (Safran, 1997). This will include personal, real-time exchanges between students and zoo- and aquarium-based field scientists working in remote locations. Institutional and national/regional association Web sites will be rich sources of information for both the general public and zoological professionals (Hardy, 1994; Koontz, 1996; Kittle & Newman, 2001).

Animal care and husbandry Zoos and aquariums are bound by governmental regulations regarding minimum standards of animal care and many professional zoological associations set even higher standards for accreditation (e.g. AZA, 2000a; Cooper, this volume). A world-class zoo or aquarium will far surpass these basic expectations to ensure that both the physical and psychological needs of all the animals in their collections are being met or exceeded. These superior institutions will be seen as proponents of both animal welfare and wildlife conservation (Maple *et al.*, 1995; Hutchins, 2001, this volume). The physiological needs of animals shall be met through expert veterinary care, nutrition and exhibit design to maintain optimal health of all animals in the collection. Psychological health is a less defined and more complex issue (see also Kirkwood, this volume). In order to provide animals with adequate stimuli and activities, exhibits in world-class zoos and aquariums will not only be aesthetically pleasing to the public but also replicate many critical aspects of the natural environment of a species (Kreger *et al.*, 1998; Andersen, this volume; Shepherdson, this volume). Naturalistic exhibits, which immerse visitors in the habitat of the animals, will become commonplace but outstanding institutions will take them one step further by seeking to integrate fully our knowledge of animal behaviour with exhibit design (Maple *et al.*, 1995; Coe, 1996; Seidensticker &

Doherty, 1996; Andersen, this volume; Hutchins, this volume). World-class zoo and aquarium exhibits will pay as much attention to the organisms displayed as to the aesthetic experience of the visitor. More specifically, world-class institutions will develop and implement formal environmental-enrichment plans for all species under their care and incorporate them into every aspect of exhibit design and day-to-day animal management (Hutchins, 2001, this volume). As recommended by Shepherdson *et al.* (1998), these enrichment activities will present captive animals with cognitive challenges, allow opportunities for appropriate social interaction and exploration, give the animals some control over their environment, and meet species-specific behavioural needs through the provision of shelter, hiding, foraging and exercise. As such considerations are fully incorporated into exhibit design, the term 'environmental enrichment' will become passé. There is no need to enrich an exhibit unless it is somehow inadequate (A. Baker, pers. comm.)

A world-class zoo or aquarium will seek to ensure that the basic husbandry needs of the animals are being met even after they leave the institution and in doing so will demonstrate reverence and respect for all life. Such institutions will develop and adhere to detailed regional and institutional animal acquisition and disposition policies that both minimize the impact on wild populations and assure that animals leaving the facility are provided with appropriate care (e.g. AZA, 1999d; Hutchins, 2001). In some cases this may mean the establishment of 'retirement' facilities (Lindburg & Lindburg, 1995) or increased co-operation with existing, qualified sanctuaries (Hutchins, 2001). Outstanding institutions will also plan their collections carefully and follow the recommendations of co-operative breeding programmes. This will help to ensure that populations remain well within the limited captive 'carrying

capacity' for each species. This should also greatly reduce the probability that animals from accredited zoos or aquariums will end up in the hands of people not qualified to care for them (Hutchins *et al.*, 1995; Hutchins, 2001, this volume).

Research It has long been recognized that there is a need to establish a strong foundation for the science of zoo and aquarium animal management (Thompson 1993; Kleiman *et al.*, 1996; see also Ryder, this volume; Wildt, this volume). Many zoos and aquariums conduct research that contributes to our knowledge of wild animals and their habitats and captive animal management (Hutchins *et al.*, 1996). However, many others have not yet implemented formal research programmes. In order to be considered 'world class', a zoo or aquarium will need to have a formal research programme that includes an institutional mission statement, a method for evaluating research proposals and protocols for visiting scientists (Hutchins, 1988). These institutions will also have developed strong co-operative relationships with local colleges and universities, and made their animal collection and biological materials available for appropriate and approved research and educational activities (Hutchins, 1988; Maple *et al.*, 1995). They will also make the public and scientific community aware of their activities through publications in books, proceedings and peer-reviewed journals, and presentations at relevant conferences.

In the world-class zoo or aquarium, research will not be focused exclusively on the animal collection or on wildlife-conservation topics but rather integrated into all aspects of the zoological business. Among other things, advanced zoos and aquariums will use quantitative research techniques to evaluate the success of their marketing programmes, assess 'customer' satisfaction and study the use visitors make of the grounds and public services. In short, a systematic approach to

problem solving will become an integral part of institutional operations.

Conservation A strong commitment to wildlife and habitat conservation should be central to any professionally managed zoo or aquarium of the 21st century (Schubel, 1998; Conway, 1999a; Hutchins, 1999, this volume; Conway & Hutchins, 2001). The world-class institution will recognize that simply sustaining captive populations of wild animals, whether they are endangered or not, should not by itself be considered conservation (Wiese *et al.*, 1994; Hutchins *et al.*, 1995, 1996). Consequently, world-class facilities will need to establish a strong link between their living collection and the conservation of wildlife and their habitats in nature (Conway, 1999a; Hutchins, 1999; Conway & Hutchins, 2001). Outstanding institutions will execute their conservation mission through a broad spectrum of activities, including: public education, scientific research, development of relevant technologies, professional training and technology transfer, conservation planning, nature travel programmes, captive breeding for reintroduction, ecological restoration, the direct support of national parks and equivalent reserves, and fundraising to support these activities (Hutchins & Conway, 1995; Hutchins *et al.*, 1996; Conway, 1999a,b; Hutchins, 1999, this volume; Conway & Hutchins, 2001; see also Stanley Price & Soorae, this volume). Additionally, they will collaborate with local, state and federal government wildlife agencies to assist in native species recovery and habitat conservation 'in their own backyards' (Diebold *et al.*, 1997; Hutchins, this volume) or to advance conservation in other countries (Mallinson, 1991). World-class institutions will also experiment with 'extractive reserves', where limited, sustainable collecting of non-threatened animals for exhibition can be accomplished in a way that does not harm wild populations, while at the same time, helping to support

the reserve and local economy (Andrews *et al.*, 1998; Conway, 1998; Hutchins, this volume). The institution's own purchasing, energy consumption, resource use and waste-management practices should also be consistent with its commitment to conservation (Fields, 1990; Bartos & Kelly, 1998; Schubel, 1998).

In order to make sure that all programmes are implemented in the most effective and cost-efficient manner, world-class institutions will describe and prioritize their conservation objectives in a detailed plan and be able to show evidence of implementation (Hutchins, 1999). Perhaps most important, such institutions will collaborate and share resources freely with other organizations and institutions, thereby greatly multiplying their impact on conservation (Hutchins, 1999, this volume).

Education The world-class zoo or aquarium of the 21st century will not consider itself to have an effective education programme simply because it displays graphics for visitors (see also Andersen, this volume). In order to be outstanding, conservation-education programmes must inspire people to change their attitudes and behaviour to benefit wildlife and their habitats (Monroe & De Young, 1993; Delapa, 1994; Mott & Boyle, 2000).

The world-class facility will employ professional educators to develop an effective conservation-education programme that not only entertains and informs visitors but also compels them to take conservation action. Such institutions will also evaluate the effectiveness of their conservation-education programmes by quantitatively measuring their impact on visitor behaviour, attitudes and knowledge (Briese, 1999; Hutchins, this volume). Outstanding zoos and aquariums will also develop co-operative relationships with local elementary and secondary schools, colleges and universities to help integrate conservation education into course curricula. Additionally,

these institutions will export their conservation-education expertise to developing countries, helping to train educators and provide educational materials (see also Butler, 2000; Carr, 2001; Hutchins, this volume). They will also work with local counterparts to produce culturally appropriate and effective educational messages (e.g. Ness, 1999).

In order to hold the attention of visitors and impart relevant messages and information, zoos and aquariums of the future will employ a wide variety of presentation strategies, including lectures, interactive computer displays, learning games, film, theatre, music and art (Fiore, 1993; Krakauer *et al.*, 1994; Greer, 1997; Rutledge, 1998). The goals of education and entertainment are not necessarily antithetical but world-class zoological institutions of the future will take great care not to exploit wild animals for entertainment purposes. The days of chimpanzee tea parties, elephant rides, and circus-like seal or dolphin shows have passed. Animal demonstrations of the future, even those that involve close human-animal interaction, will emphasize respect for wildlife (Hopper, 1996). They will also seek to develop concern for the future of life on this planet (Martin, 1993).

Exhibit design In the 21st century, visitors will view animals in large, naturalistic exhibits, where vegetation simulates that found in the wild and helps to lend an air of authenticity to the experience (see also Embury, 1992; Arnott *et al.*, 1994; Jackson, 1996). The animals will be in appropriate social groups and will also be exhibiting behaviours similar to those seen in their wild counterparts (Coe, 1996; Shepherdson, 1998). The clear educational message will be that habitat conservation is critical for the future of wild animals and must be among society's highest priorities (Myers, 1979).

World-class animal exhibits of the future will not only immerse visitors in the

natural habitat of the animals (Coe, 1996) but also inspire them to explore the wondrous world of nature and show them how they can take conservation action. Zoo visitors can contribute to conservation in numerous ways, including volunteering their time, becoming politically active, adopting environmentally responsible lifestyles and contributing funds. Inspired visitors will be given an opportunity to make a financial contribution to a given conservation project on the spot; thus empowering them to make a difference for wildlife and wild places (Conway, 1999b; Conway, this volume).

Government affairs Zoos and aquariums of the future will use their collective political power to influence legislation addressing conservation initiatives and other issues important to the zoological profession (Hutchins & Conway, 1995; Allread, 1997; Hutchins, 1999). World-class zoos and aquariums will lobby through their regional zoo and aquarium association and other global organizations, for example, IUCN (The World Conservation Union) to affect legislative change. They will also develop strong working relationships with local, state and federal elected government officials and other organizations that have similar goals (Hutchins, this volume).

Marketing and development Zoos and aquariums, whether public or private, require a constant stream of revenue in order to fulfil their core goals of quality animal care, conservation, science and education (Greene, 1997; Freiheit, 1998; Hutchins & Ballentine, 2001). Competition for limited funding opportunities is increasing and, in order to take advantage of unprecedented levels of corporate and personal charitable giving, zoos and aquariums must begin to position themselves with the donor community (Redfield, 1995; Bailey, 1997; Williams, 2001). To attract new donors and retain previous ones, zoos and aquariums must

also be more businesslike in their operations, including budgeting and financial reporting. In a recent survey of 200 wealthy donors to accredited North American zoos and aquariums, only one in five thought that recipient institutions managed their resources in a businesslike fashion (Beattie, 1994).

The world-class zoo of the 21st century will implement strong and innovative marketing and development strategies that provide a solid financial base for the institution while helping to support educational, scientific and conservation goals. Superior zoological institutions will develop strong partnerships with local businesses and corporations and ensure that the local community supports their objectives. They will also provide excellent public amenities and experiences that result in repeated and increased visitation (Bell, 1997). A critical component of effective marketing will be efforts to understand the perceived expectations of zoo audiences and evaluate visitor satisfaction (Rabb, 1999). Competition for leisure dollars will be intense. Zoos and aquariums of the future will have to be compelling enough to compete with other forms of family-orientated recreation, such as television, cinemas, museums, amusement parks and the ubiquitous shopping malls.

Public relations Public relations is becoming increasingly important in a world inhabited by an ample share of irresponsible journalists and various extremist groups. As public institutions that care for live animals, zoos and aquariums of the 21st century will be under close scrutiny. The world-class zoo will not only try to satisfy the people that it directly affects but also enter into a dialogue with its critics and attempt to find solutions to perceived conflicts (Maple *et al.*, 1995). Often, there is no middle ground between animal-rights proponents and wildlife conservationists, and the two may come into direct philosophical conflict (Hutchins & Wemmer, 1986; Lind-

burg, 1999). In those cases, world-class zoos and aquariums and their regional associations will use their strong public-relations and educational skills to communicate clearly the mission, goals and accomplishments of both the institution and the profession to the public and relevant key decision makers. The best institutions will have crisis-intervention strategies to deal with delicate situations and will approach such challenges openly and honestly (Allen, 1995; Chan *et al.*, 1999). World-class zoos and aquariums will recognize that the best way to deal with any issue is not to look for a public-relations spin but to confront it directly and try to anticipate and shore up any weaknesses before they cause problems.

CONCLUSION

If zoos and aquariums are to meet the many challenges of the 21st century they must continue to evolve and, in some cases, this change must come rapidly (Rabb, 2001). While a commitment to conservation, science and education is viewed as key to the future of zoological institutions (Conway, 1999a; Conway & Hutchins, 2001; Hutchins, this volume), many other aspects of zoo and aquarium management must continue to evolve concurrently. The core missions of the zoo and aquarium profession will not be attainable if other important factors, such as organizational structure and philosophy, employee recruitment, training and retention, and development and marketing, are neglected or left unresolved. A new generation of zoo managers must take a more holistic approach, while at the same time, never losing sight of their primary objectives.

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